(1)

INSTALLATION RESTORATION PROGRAM

Preliminary Assessment

180th Tactical Fighter Group
Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio

and

200th Red Horse
Civil Engineering Squadron
Ohio Air National Guard
Camp Perry ANG Station
Port Clinton, Ohio

November 1989

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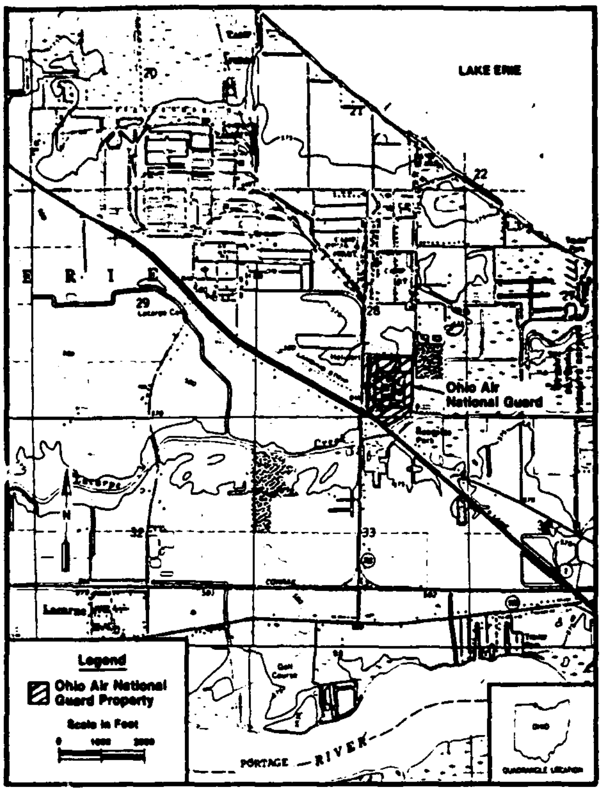
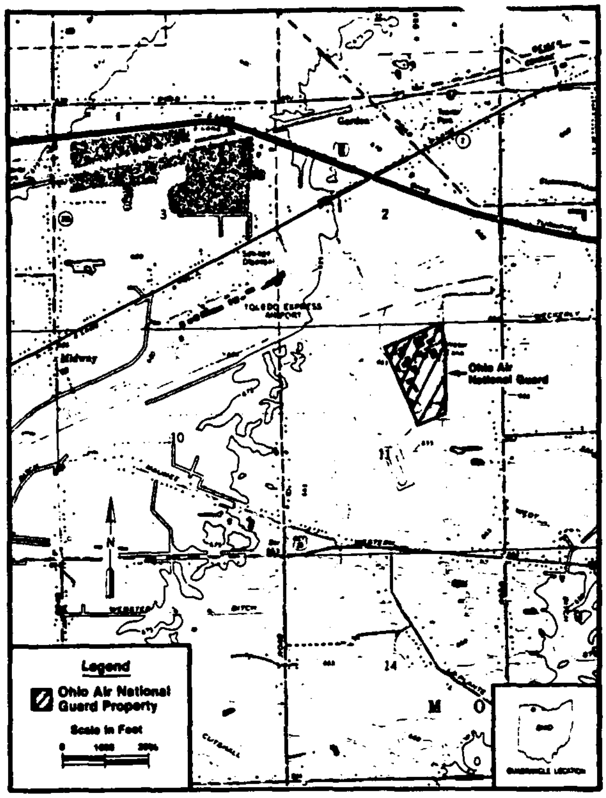


Base Map of the 200th RHCES, Ohio Air National Guard, Camp Perry ANG Station, Port Clinton, Ohio.



Location Map of the 200th RHCES, Ohio Air National Guard, Camp Perry ANG Station, Port Clinton, Ohio.

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180th TACTICAL FIGHTER GROUP
OHIO AIR NATIONAL GUARD
TOLEDO EXPRESS AIRPORT
SWANTON, OHIO

and

200th RED HORSE CIVIL ENGINEERING SQUADRON
OHIO AIR NATIONAL GUARD
CAMP PERRY ANG
PORT CLINTON, OHIO

November 1989

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ACRONYM LIST

AGE	-	Aerospace Ground Equipment
ANG	-	Air National Guard
DRMO	-	Defense Reutilization and Marketing Office
EPA	-	Environmental Protection Agency
FR	-	Federal Register
FTA	-	Fire Training Area
HARM	-	Hazard Assessment Rating Methodology
HAS	-	Hazard Assessment Score
HM/HW	-	Hazardous Materials/Hazardous Wastes
HMTC	-	Hazardous Materials Testing Center
IRP	-	Installation Restoration Program
MEK	-	Methyl Ethyl Ketone
MIBK	-	Methyl Isobutyl Ketone
NDI	-	Non-Destructive Inspection
NOAA	-	National Oceanic and Atmospheric Administration
OWS	-	Oil Water Separator
PA	-	Preliminary Assessment
PCB	-	Polychlorinated Biphenyl
PE	-	Professional Engineer
PG	-	Professional Geologist
POC	-	Point of Contact
POL	-	Petroleum, Oil, and Lubricant
RD/RA	-	Remedial Design/Remedial Action
RD&D	-	Research, Development, and Demonstration
RHCES	-	Red Horse Civil Engineering Squadron
SI/RI/FS	-	Site Investigation/Remedial Investigation/Feasibility Study
TFG	-	Tactical Fighter Group
USAF	-	United States Air Force
USDA	-	United States Department of Agriculture
UST	-	Underground Storage Tank

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FOREWORD

This Preliminary Assessment (PA) document was originally prepared for the National Guard Bureau (NGB) by the Hazardous Materials Technical Center (HMTC), operated by the Dynamac Corporation. HMTC's contract for conducting PAs ended prior to completion of the final PA document. Subsequently, the NGB requested completion of this PA under an existing contract with the Hazardous Waste Remedial Actions Program (HAZWRAP) Support Contractor Office, operated by Martin Marietta Energy Systems, Inc. for the U.S. Department of Energy. In turn, HAZWRAP subcontracted with Science and Technology, Inc. for completion of the PA document. Science and Technology, Inc. successfully completed this document in November 1989.

Science and Technology, Inc. produced the final document primarily by addressing comments generated by the NGB through review of HMTC draft documents. Since HMTC conducted the PA and prepared the original PA manuscript, the content of this document is principally a reflection of HMTC's efforts.

EXECUTIVE SUMMARY

A. Introduction

The Hazardous Materials Technical Center (HMTC) was retained in April 1988 to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 180th Tactical Fighter Group (TFG), Ohio Air National Guard, Swanton, Ohio, (hereinafter referred to as the Base) and the 200th Red Horse Civil Engineering Squadron (RHCES), Ohio Air National Guard, Camp Perry ANG Station, Port Clinton, Ohio (hereinafter referred to as the Station), under Contract No. DLA-900-82-C-4426.

The Preliminary Assessment included:

- o an on-site visit, including interviews with 14 past and present Base and four past and present Station employees conducted by HMTC personnel during April 11-14, 1988;
- o the acquisition and analysis of pertinent information and records on hazardous material use and hazardous waste generation and disposal at the Base and Station;
- o the acquisition and analysis of available geologic, hydrologic, meteorologic, and environmental data from pertinent Federal, State, and local agencies;
- o and the identification of sites on the Base and the Station that are potentially contaminated with hazardous materials/hazardous wastes (HM/HW).

B. Major Findings

BASE:

Past Base operations involved the use and disposal of materials and wastes that were subsequently categorized as hazardous. The major operations of the Base that use and dispose of HM/HW include Aircraft Maintenance; Ground Vehicle Maintenance; Petroleum, Oil, and Lubricant (POL) Management, and Distribution.

Varying quantities of waste oils, recovered fuels, spent cleaners, and solvents were generated by these activities.

Interviews with 14 past and present Base personnel and a field survey resulted in the identification of eight disposal and/or spill sites at the Base that are potentially contaminated with HM/HW and were assigned a Hazard Assessment Score (HAS) according to the U.S. Air Force Hazard Assessment Rating Methodology (HARM). These potential sites are described as follows:

Site No. 1 - Fire Training Area No. 1

From the late 1950s to 1966, the Base used this fire training area (FTA), which was located approximately 70 feet east of Building 118 in an area then covered by open field. Training exercises were conducted approximately 18 times per year using 250 to 500 gallons of flammable liquid per exercise. Substances, including AVGAS; JP-4; solvents; and waste oils from the Base shops, were burned at the FTA.

Site No. 2 - Fire Training Area No. 2

Fire Training Area No. 2 served as the major site for Base fire training between 1966 and 1978. It was located approximately 70 feet southwest of FTA No. 1. The frequency of use and quantity of fuel used at this site were similar to that at FTA No. 1, discussed above. The majority of the liquid burned at this site was JP-4; however, small quantities of wastes such as oils, solvents, and strippers from the Base shops were also disposed of here. Fire training at FTA No. 2 was discontinued briefly in the early 1970s.

Site No. 3 - Fire Training Area No. 3

Fire Training Area No. 3 was located inside of the fenced area where the Motor Pool (Building 119) now stands. This FTA was reportedly used only once or twice in the early 1970s and then abandoned due to the proximity of the FTA to planned construction

sites and complaints from the airport about smoke blowing across the runway.

Site No. 4 - Fire Training Area No. 4

Fire Training Area No. 4 was located just north of the small arms range. This area was used for about 6 months in the early 1970s, immediately after fire training was discontinued at FTA No. 3. This FTA was abandoned because the sandy soil at the site would not retain water so the fuel could be floated prior to ignition.

Site No. 5 - POL Storage Area

The POL facility has four 25,000-gallon underground storage tanks. Numerous small spills ranging from 200 to 300 gallons have occurred since the late 1950s.

Site No. 6 - Western Drainage Area

The western drainage ditch runs parallel to the Base boundary and receives storm drainage from the northwestern portion of the Base, including effluent from oil water separators (OWSs) located on this portion of the Base. This drainage ditch shows signs of organic contamination.

Site No. 7 - Eastern Drainage Area

The drainage ditch that parallels the eastern boundary of the Base receives storm drainage from the eastern portion of the Base, including the POL facility and OWSs located on this portion of the Base. Organic contamination was observed in the northern portion of this ditch.

Site No. 8 - Fire Training Area No. 5

Fire Training Area No. 5 was a curbed concrete burn pad located west of Civil Engineering (Building 120). The pad was used two or three times in the mid 1980s to burn a total of about 300 gallons of a

mixture of waste oils and solvents pumped from the shop oil water separators (OWSs). After the burns, any remaining liquids were drained to the storm drainage ditch adjacent to the burn pad.

STATION:

Past Station operations involved the use and disposal of materials and wastes that were subsequently categorized as hazardous. The major operations of the Station that use and dispose of HM/HW include Equipment and Pavement and the Motor Pool. Waste fuel, paint stripper, waste oils, lacquer, and battery acid are generated by these activities.

Interviews with four past and present Station personnel and a field survey resulted in the identification of no disposal and/or spill sites at the Station that are potentially contaminated with HM/HW.

C. Conclusions

BASE:

Information obtained through interviews with past and present Base personnel resulted in the identification of the following eight areas on the Base that are potentially contaminated with HM/HW:

Site No. 1 - FTA No. 1

Site No. 2 - FTA No. 2

Site No. 3 - FTA No. 3

Site No. 4 - FTA No. 4

Site No. 5 - POL Storage Area

Site No. 6 - Western Drainage Area

Site No. 7 - Eastern Drainage Area

Site No. 8 - FTA No. 5

At each of the identified sites, the potential exists for contamination of surface water, soils, or groundwater and subsequent contaminant migration. Each of these sites was therefore assigned a HAS according to HARM.

STATION:

Information obtained through interviews with past and present Station personnel resulted in the identification of no areas on the Station that are potentially contaminated with HM/HW.

D. Recommendations

BASE:

Further IRP investigation is recommended for the following sites:

Site No. 1 - FTA No. 1

Site No. 2 - FTA No. 2

Site No. 3 - FTA No. 3

Site No. 4 - FTA No. 4

Site No. 5 - POL Storage Area

Site No. 6 - Western Drainage Area

Site No. 7 - Eastern Drainage Area

Site No. 8 - FTA No. 5

STATION:

No further IRP investigation is recommended.

I. INTRODUCTION

A. Background

The Ohio Air National Guard (ANG) at the Toledo Express Airport, Swanton, Ohio (hereinafter referred to as the Base) supports the 180th Tactical Fighter Group (TFG). The unit was established at Toledo in 1958-59. The Base supports a geographically separate unit, the 200th Red Horse Civil Engineering Squadron (RHCES) located at Camp Perry ANG Station, Camp Perry, Ohio (hereinafter referred to as the Station). Past operations at the Base and Station involved the use and disposal of materials and wastes that subsequently were categorized as hazardous. Consequently, the National Guard Bureau has implemented its Installation Restoration Program (IRP).

The IRP consists of the following:

- Preliminary Assessment (PA) - to identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment.

- Site Investigation/Remedial Investigation/ Feasibility Study (SI/RI/FS) - to acquire data via field studies for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment and to select a remedial action through preparation of a feasibility study.

- Research, Development, and Demonstration (RD & D) - if needed, to develop new technology for accomplishment of remediation.

- Remedial Design/Remedial Action (RD/RA) - to prepare designs and specifications and to implement site remedial action.

B. Purpose

The purpose of this Preliminary Assessment is to identify and evaluate suspected problems associated with

past hazardous waste handling procedures, disposal sites, and spill sites on the Base and Station. Personnel from the Hazardous Materials Technical Center (HMTC) visited the Base and Station, reviewed existing environmental information, analyzed Base and Station records concerning the use and generation of hazardous materials/hazardous wastes (HM/HW), and conducted interviews with past and present Base and Station personnel who are familiar with past hazardous materials management activities.

A physical inspection was made of the suspected sites. Relevant information collected and analyzed as a part of the Preliminary Assessment included the history of the Base and Station, local geologic, hydrologic, and meteorologic conditions that may affect migration of contaminants; local land use and public utilities that could affect the potential for exposure to contaminants; and the ecologic settings that indicate environmentally sensitive habitats or evidence of environmental stress.

C. Scope

The scope of this Preliminary Assessment is limited to the Base and Station and includes:

- An on-site visit;
- The acquisition of pertinent information and records on hazardous materials use and hazardous wastes generation and disposal practices at the Base and Station;
- The acquisition of available geologic, hydrologic, meteorologic, land use, critical habitat, and utility data from various Federal, State, and local agencies;
- A review and analysis of all information obtained; and
- The preparation of a report to include recommendations for further actions.

The on-site visit and interviews with past and present Base and Station personnel were conducted during the period April 11-14, 1988. The Preliminary Assessment was conducted by Ms. Kathryn Gladden, Task Manager/Staff Engineer; Ms. Betsy Briggs, Hazardous Waste Specialist; and Mr. David Hale, Staff Engineer. Other HMTC personnel who assisted with the Preliminary Assessment include Mr. Raymond G. Clark, P.E./Department Manager; Ms. Grace Hill, Environmental Scientist; and Mr. Mark Johnson, P.G./Program Manager. Resumes of HMTC personnel are attached in Appendix A. Personnel from the Air National Guard Support Center who assisted in the Preliminary Assessment include Mr. Daniel Waltz, Project Officer and Ms. Sicy Jacob. Individuals from the Base who participated in the Preliminary Assessment include Lt. W. L. Antoszewski, the Base Point of Contact (POC), and Captain Michael Duffey.

D. Methodology

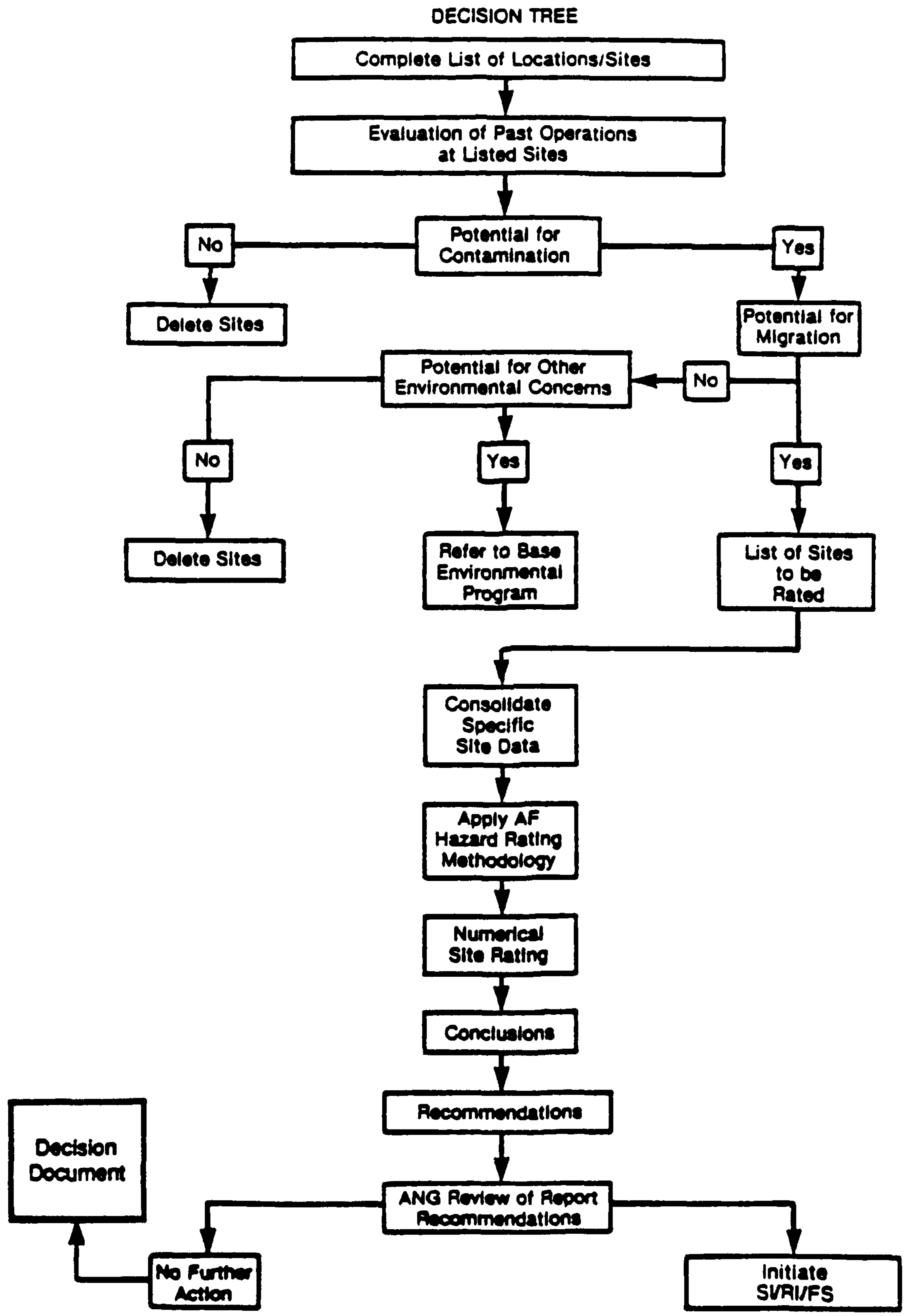
A flow chart of the Preliminary Assessment Methodology is presented in Figure 1. This methodology ensures a comprehensive collection and review of pertinent, site-specific information and is used in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

The Preliminary Assessment begins with a site visit to the Base and Station to identify all shop operations or activities on the installation that may use hazardous materials or generate hazardous wastes. Next, an evaluation of both past and present HM/HW handling procedures is made to determine whether any environmental contamination has occurred. The evaluation of past HM/HW handling practices is facilitated by extensive interviews with past and present employees familiar with the various operating procedures at the Base and Station. These interviews also define the areas on the Base and Station where any HM/HW, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or otherwise released into the environment.

Historic records contained in the Base and Station files are collected and reviewed to supplement the information obtained from interviews. Using this information, a list of past waste spill/disposal sites on the Base and Station is generated. The listed sites

HMTC PRELIMINARY ASSESSMENT INSTALLATION RESTORATION PROGRAM

Figure 1.
Preliminary Assessment Methodology Flow Chart.



are then subject to further evaluation. A general survey of the identified sites, the Base and Station, and the surrounding area is conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention is given to locating nearby drainage ditches, surface water bodies, residences, and wells.

Detailed geologic, hydrologic, meteorologic, land use, and environmental data for the area of study is also obtained from the POC and from appropriate Federal, State, and local agencies. A list of outside agencies contacted is in Appendix B. Following a detailed analysis of all the information obtained, areas are identified as suspect areas where HM/HW disposal and/or spills may have occurred. Where sufficient information is available, sites are assigned a Hazard Assessment Score (HAS) using the U.S. Air Force Hazard Assessment Rating Methodology (HARM) (Appendix C). However, the absence of a HAS does not necessarily negate a recommendation for further IRP investigation, but rather, may indicate a lack of data. The HAS is computed from the data included in the Factor Rating Criteria. (Appendix D).

II. INSTALLATION DESCRIPTION

A. Location

BASE:

The Base is located at Toledo Express Airport, in the Township of Monclova, in western Lucas County, just south of Toledo (See Figure 2A). The Base is bordered on the north and west by Toledo Express Airport and on the east and south by agricultural and commercial properties (See Figure 2B). There are residences further to the east, south, and southwest of the airport. Figure 2C shows the location and boundary of the Base covered in this Preliminary Assessment.

STATION:

The Station is located immediately north of Route 2 within the boundaries of Camp Perry, in the Erie Township approximately three miles west of Port Clinton. Camp Perry is located in Ottawa County on the southern shore of Lake Erie approximately three miles west of the mouth of the Portage River (See Figure 2A and 2B). The properties south of Camp Perry are residential and light commercial. The Ottawa National Wildlife Refuge is located two-thirds of a mile east of Camp Perry. Camp Perry is approximately 68 miles east of Toledo Express Airport. The Army National Guard is also located at Camp Perry and is a major user of Camp Perry. Figure 2D shows the location and boundary of the Station covered in this Preliminary Assessment.

B. Organization and History

BASE:

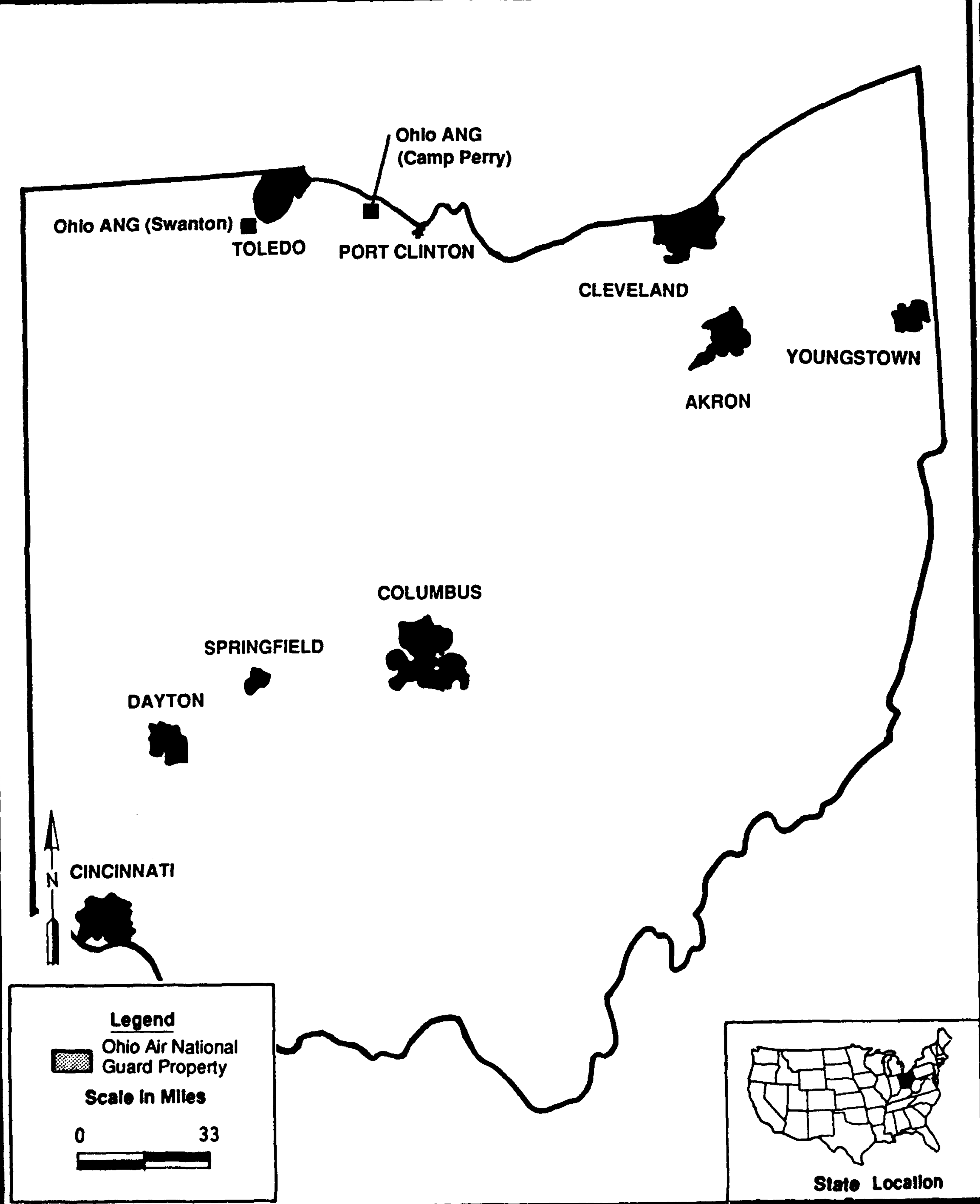
Prior to 1957, the area on which the Base is sited was undeveloped lowlands. In that year, construction began on the original Base facilities, including the hangar; firehouse; Air Ground Equipment (AGE) shop; Base Supply; Petroleum, Oil, and Lubricants (POL); water and wastewater treatment plants. Since that time, the Base has grown to 84 acres in size and includes 32 facilities.

From the start, the mission of the Base has been to provide tactical fighter aircraft in support of the U.S. Air Force mission. The weapon systems in place at the

HMTC Source: Interstate Road Atlas, 1984.

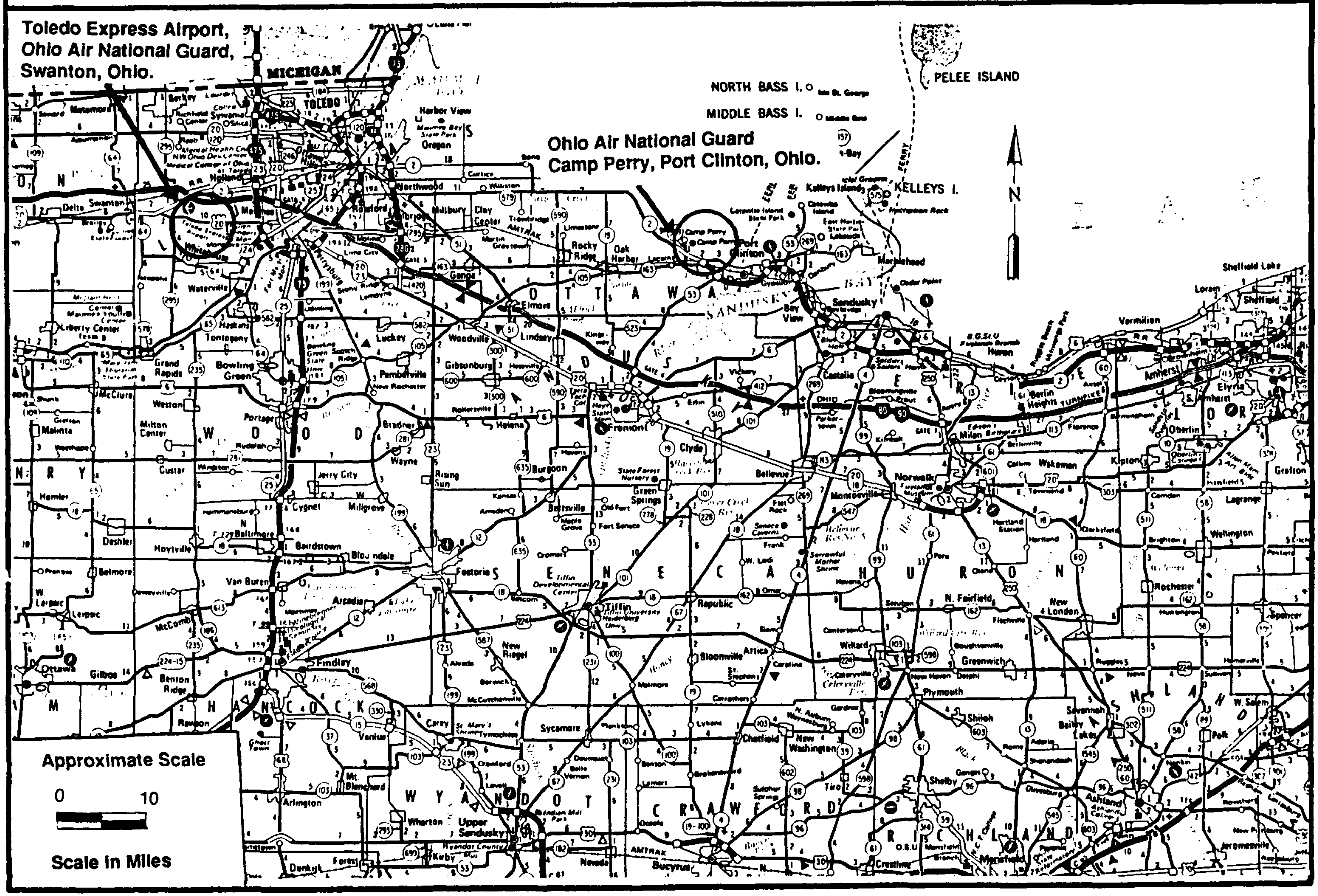
Figure 2A.

Location of the Camp Perry Air National Guard Station and the Toledo Air National Guard Base



Source: Interstate Road Atlas, 1984.

Figure 2B.
Northwestern Ohio Road Map

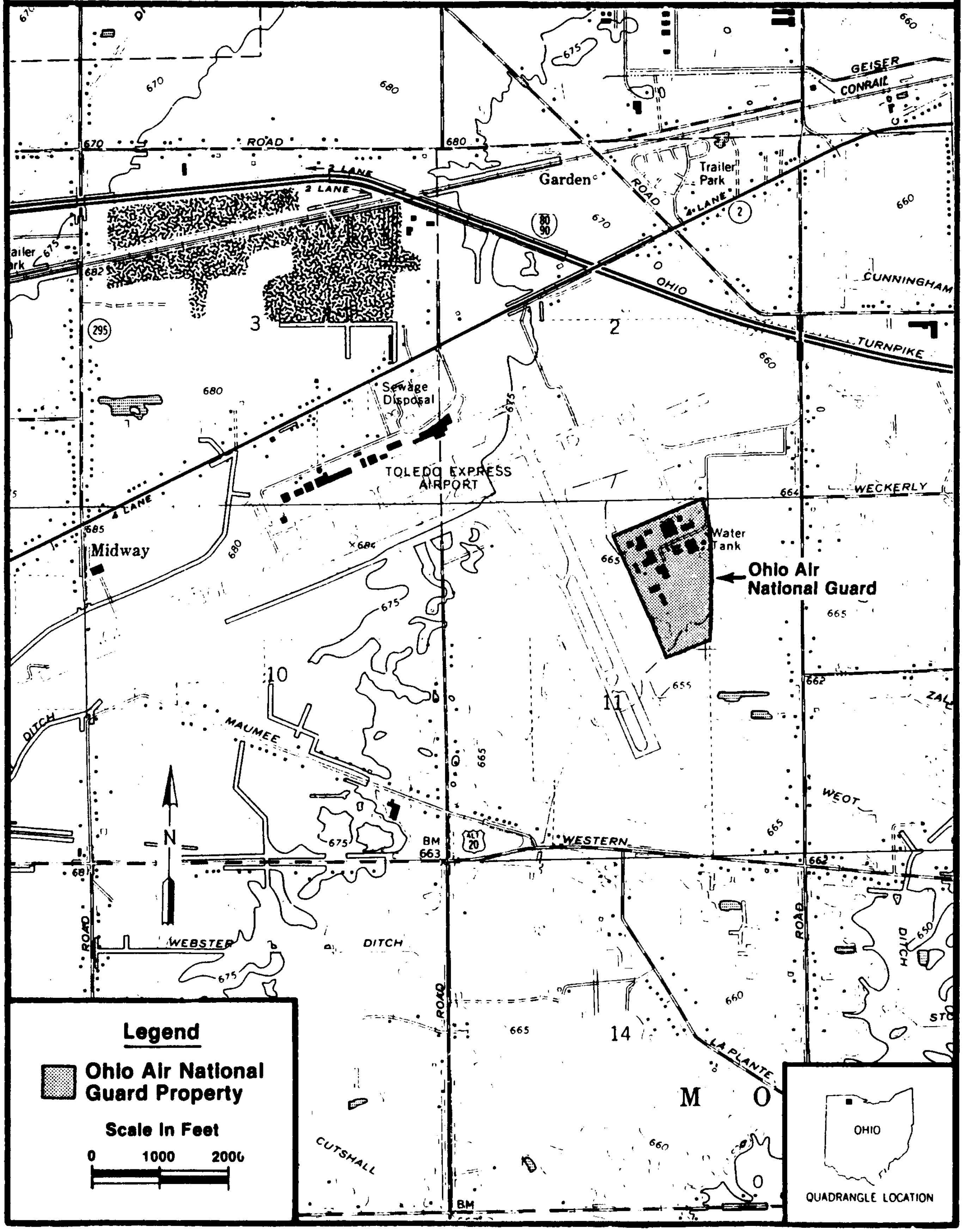


HMTC

Adapted From:
USGS 7.5 Minute Quadrangle
Whitehouse (1980)

Figure 2C.

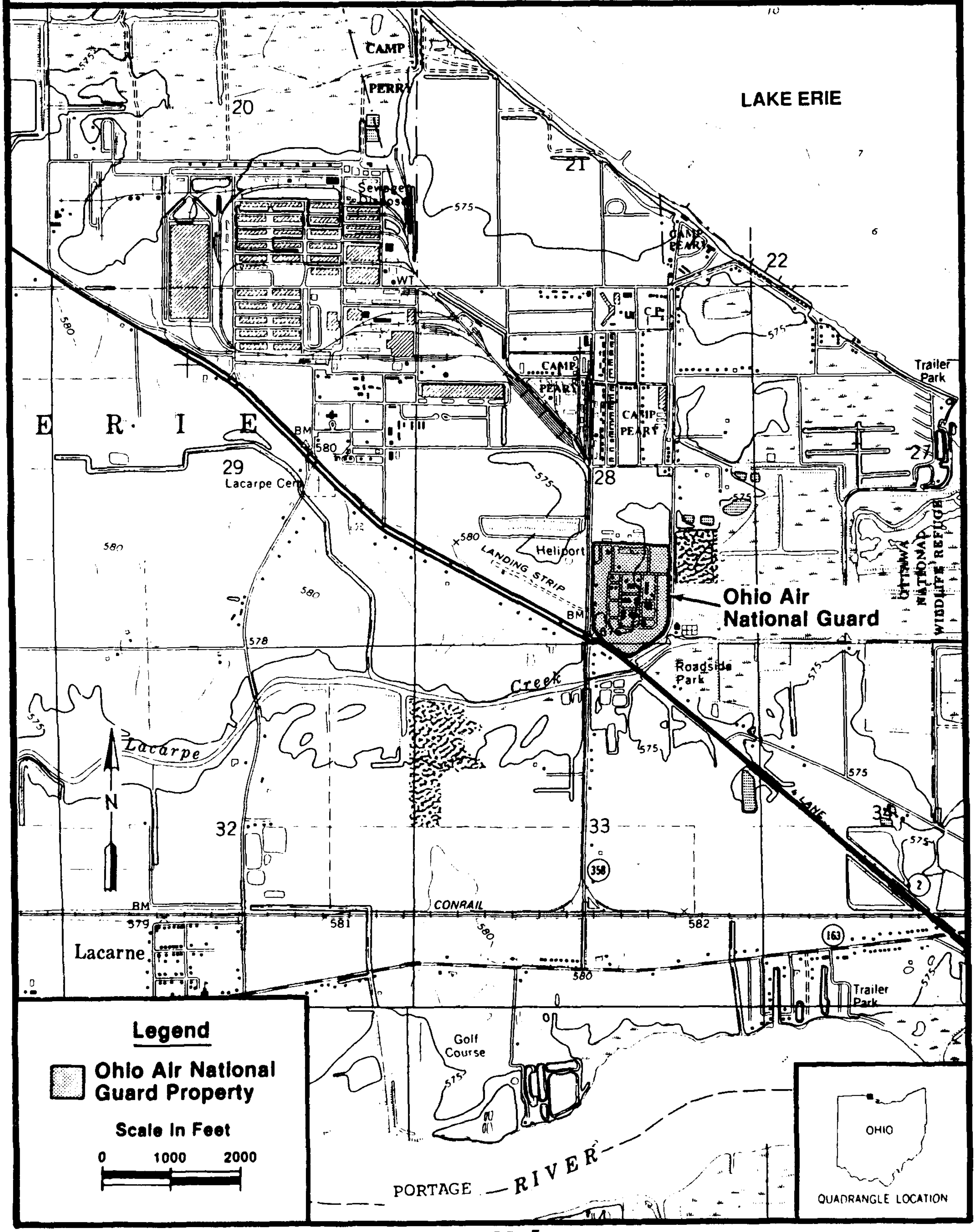
Location Map of the 180th TFG, Ohio Air National Guard, Toledo Express Airport, Swanton, Ohio.



HMTC

Adapted From:
USGS 7.5 Minute Quadrangle
Lacarne (1980)

Figure 2D.
Location Map of the 200th RHCES, Ohio Air National Guard, Camp Perry ANG Station, Port Clinton, Ohio



Base have been: P-51 (1956-1969), F-84 (1969-1971), F-100F (1971-1979), and A-7D (1979 to present) aircraft.

STATION:

The 200th Red Horse Civil Engineering Squadron (RHCES) was federally recognized in September 1971 as the first Air National Guard Red Horse unit. The 200th RHCES is a geographically separated unit and is supported by the 180th TFG. The 200th RHCES is assigned to Camp Perry; however, it is not associated with the Ohio Army National Guard training site also located at Camp Perry. The mission of the Red Horse Squadron is to provide a highly mobile, readily deployable civil engineering response force which is self-sufficient for limited periods of time.

III. ENVIRONMENTAL SETTING

A. Meteorology

The meteorological data presented in this section is from local climatological data compiled for the Toledo, Ohio area by the National Oceanic and Atmospheric Administration (NOAA). It is applicable to both the Base and Station.

The Toledo area has a humid, temperate climate characterized by rather short periods of extreme heat and cold. Due to the proximity of Toledo to Lake Erie and the other Great Lakes, the climate is influenced by the moderating effects of these large bodies of water. Summers are typified by fairly constant humid and warm weather, while winters are usually relatively cold with variable weather conditions. The average annual temperature is 50°F, with average monthly maximum temperatures of 73°F in July and average monthly low temperatures of 26°F in January.

Precipitation in the Toledo area, for the most part, is in the form of showers and thunderstorms in the summer and rainfall and light snowfall in the winter. Rainfall is well-distributed throughout the year. Toledo has an average annual precipitation of 33.41 inches, based on the period from 1937 to 1977. Net precipitation in Toledo is +1 inch per year according to the method outlined in the Federal Register (47 FR 31224). Maximum rainfall intensity, based on 1-year, 24-hour rainfall, is 2.5 inches (47 FR 31235).

B. Geology

Regional Geology/Geography

Information for this section was obtained from Ground Water Planning in Northwest Ohio (Ohio Department of Natural Resources, 1970). The stratigraphic sequence of formations beneath the Maumee and Portage River basins (Quaternary age) represents the principal regional bedrock aquifers for Ottawa and Lucas Counties (Figure 3). These Devonian and Silurian formations are consistently thick layers of limestone and dolomite. Although the greater portion of the sequence is logged as dolomite, the erratic hydrology and chemical composition of the groundwater in this area owes its origin to the

HMTC Source: Ground Water for Planning in Northwest Ohio, 1970.

Figure 3.

Stratigraphic Column of Northwest Ohio.

STRATIGRAPHIC COLUMN

System		Group	Formation	Average Thickness	Description	Remarks
Devonian	Upper		Ohio Shale	200	Shale, black and dark brown	
Devonian	Middle	Traverse	Ten Mile Creek Dolomite	35	Dolomite, yellowish-gray and grayish-brown, dense to medium crystalline; abundant nodular white chert	Correlative in Sandusky, Seneca, Wyandot and Crawford Counties as Prout Limestone.
Devonian	Middle	Traverse	Silica Formation	30	Limestone and shale, grayish-brown, very fossiliferous	Correlative in Sandusky, Seneca, Wyandot and Crawford Counties as Olentangy Shale.
Devonian	Middle		Dundee Limestone	50	Divided into lower and upper parts: lower of limestone and dolomite, grayish-brown, finely and medium-crystalline, sucrosic, sandy, upper part of limestone, yellowish-gray, fine- to coarse-grained, very fossiliferous; basal portion of upper Dundee lithographic limestone in much of northwest Ohio	Correlative in Sandusky, Seneca, Wyandot and Crawford Counties as Delaware Limestone.
Devonian	Middle	Detroit River	Undifferentiated	80	Dolomite, gray and brown, microcrystalline; stromatolitic in part; sandy at the base	Correlative in Sandusky, Seneca, Wyandot and Crawford Counties as Columbus Limestone.
Devonian	Middle	Detroit River	Sylvania Sandstone	25	Sandstone, white, fine- and medium-grained	
			-unconformity-			
Silurian	Upper		Raisin River Dolomite	350	Dolomite, brown, microcrystalline, medium- to thick-bedded	In VanWert County, these three formations change laterally into biohermal and biostromal dolomite that is considered an extension of the Fort Wayne carbonate bank described in adjacent areas of Indiana by Pinsak and Shaver (1964). Stratigraphic position of the Tymochtee is below the C-shale of the evaporite-bearing Salina Group in the subsurface of northwestern and northeastern Ohio
Silurian	Upper		Tymochtee Dolomite	100	Dolomite, grayish-brown, microcrystalline, thin-bedded; locally interbedded with very argillaceous dark-gray dolomite; numerous black carbonaceous partings upon weathering give shaly look to outcrops	
Silurian	Upper		Greenfield Dolomite	50	Dolomite, brown, microcrystalline, and very finely crystalline, medium-bedded, stromatolitic, sucrosic in part	
Silurian	Middle	Lockport	Undifferentiated	200	Dolomite, gray and white, finely to coarsely crystalline, fossiliferous, porous, biostromal and biohermal; in massive beds; nodular chert in lower half in many places	
Silurian	Lower		Rochester Shale	15	Shale, green; interbedded gray and greenish-gray crinoidal dolomite	

complex environment during the deposition of these formations in the Silurian and Devonian seas. The fluctuating level of the seas created land masses partially subjected to weathering and erosion and with very uneven surfaces for the deposition of subsequent formations. Exceptionally thick formations were deposited on the flanks of the arch. Yet, some formations are missing. Perhaps these were never deposited on the crest of the major uplift area or on the crest of minor areas of disturbance in Mercer and Van Wert Counties. The Lockport Group is as much as 156 feet thick in southern Hancock County. However, it thickens to more than 336 feet in the northern portion of Ottawa County.

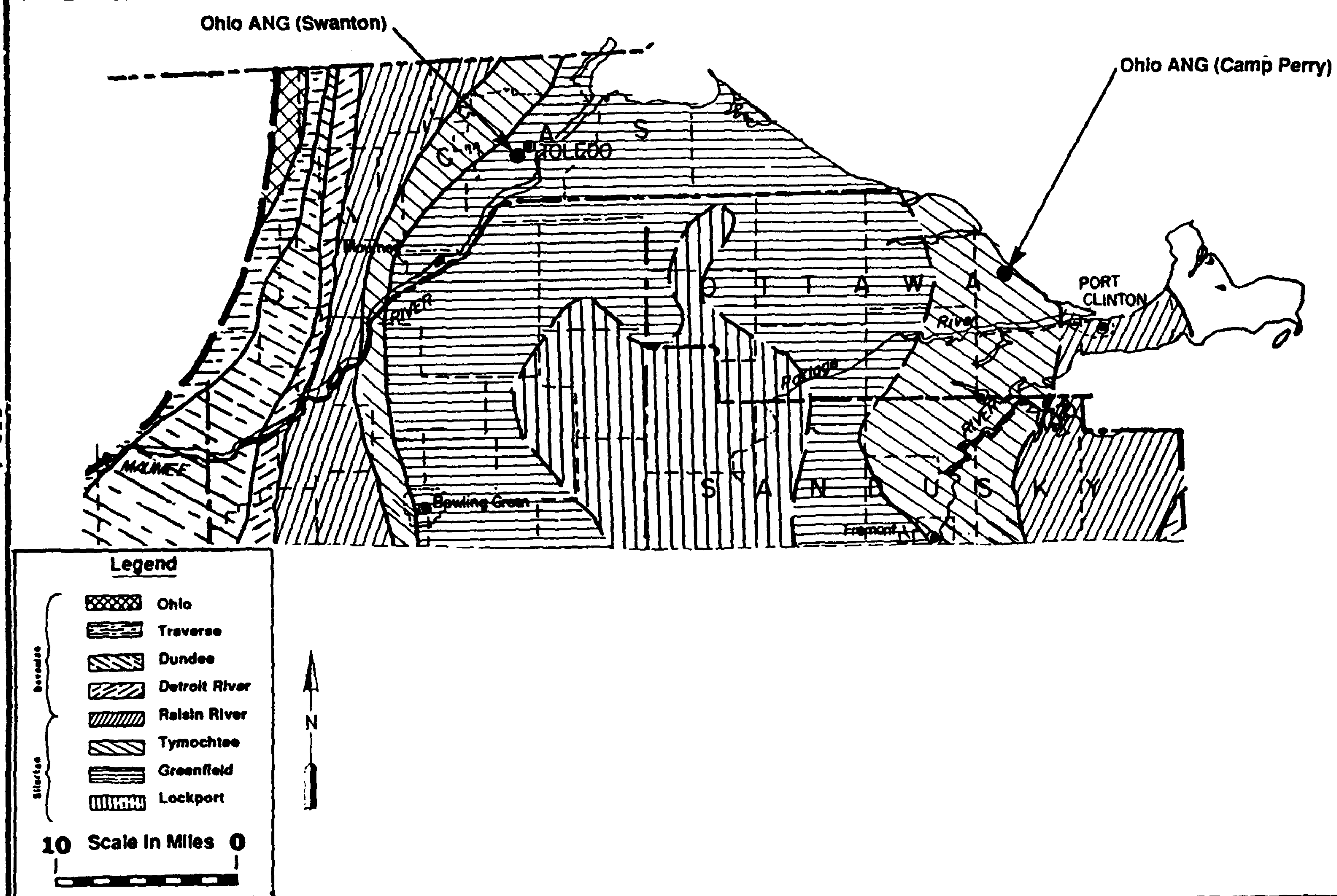
During the Silurian and Devonian periods, prior to glaciation, drainage patterns were developed on the bedrock surface, creating channels for infiltration. Where channels of drainage were carved into the bedrock surface, meltwaters from the glaciers often deposited relatively coarse sand and gravel creating excellent sources for recharge to the bedrock. In much of the area, relatively thick, impermeable glacial till was deposited during the Pleistocene epoch, deterring direct infiltration even though soluble and cavernous conditions may exist within the rock formations.

Figure 4 illustrates the sequence of bedrock in Ottawa and Lucas Counties. The Base is located in Lucas County and the Station is located in Ottawa County. The formation logged as Pre-Lockport consists of thin to relatively thick layers of gray to green shale interbedded with thin layers of dolomite. Test wells were drilled to 143 feet below the contact, and brownish shale, encountered from 285 to 330 feet deep, was logged as Rochester shale. These formations are considered as non-water-bearing. However, they are a distinctive horizon marker for the base of the Lockport Group. The basal portion of the Upper Silurian System is the Greenfield dolomite. It is quite uniform in thickness, having an average thickness of 45 feet. The physical characteristics of the Greenfield dolomite, light gray to buff with some medium to buff dolomite, are quite similar to those of the Raisin River Formation. It may be identified as Raisin River if the overlying Tymochtee Formation is missing, or if the underlying Lockport is not penetrated. The Tymochtee dolomite is medium grayish-brown grading from dark gray to black, and the average thickness is estimated as 94 feet. The overlying

Adapted From: Leow (1985)

Figure 4.

Bedrock Geology of Northwest Ohio.



Raisin River dolomite is often quite hard, dense, and medium to buff and dark gray in color.

The Detroit River Group and the Dundee limestone are the carbonate formations for the basal portion of the Devonian System in this area. The Detroit River Group ranges from 25 to 44 feet thick. Relatively uniform thicknesses are recorded for the Dundee limestones. Ranges of 20 to 53 feet were recorded from test wells. These formations are somewhat uniform in their physical characteristics with light to medium buff or gray limestone grading to dark gray or brown dolomite.

The Traverse Group includes the Ten Mile Creek dolomite and the Silica Formation. The Traverse Group includes soft, dark gray shaley limestone and dark brown shale. Its thickness ranges from 25 to 91 feet with an average thickness of 52 feet. The overlying Ohio shale is considered as a non-water-bearing formation. The Ohio shale is a black, fissile gray to brown shale with an average thickness of 200 feet.

Local Geology

BASE:

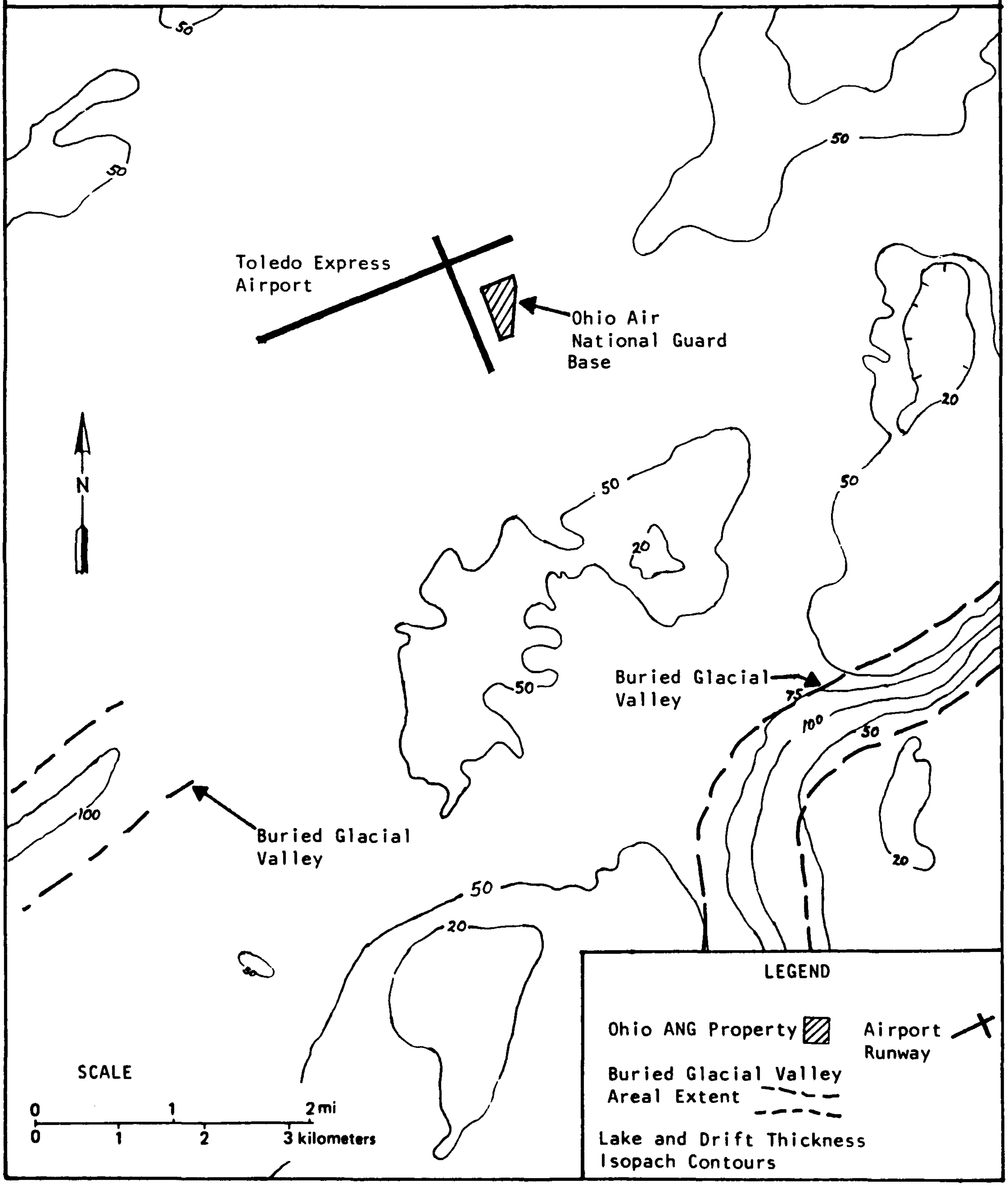
The surficial sediments (0-20 feet below the land surface) at the Base and in its immediate vicinity in Lucas County consist of lake deposits that were deposited when Lake Erie covered Lucas County and much of northwestern Ohio. Soil borings drilled at the Base (Appendix E) indicate that these sediments consist predominately of fine- to coarse-grained quartz sand with small amounts of silt and clay.

Glacial drift underlies lake deposits throughout Lucas County and much of northwestern Ohio. As illustrated in Figure 5A, glacial drift and lake deposit thickness at the Base and in its immediate vicinity ranges from a thin veneer to a maximum of 150 feet. Glacial drift at the Base ranges from 40 to 50 feet thick. Abrupt thickness increases in glacial drift commonly indicate the presence of buried glacial valleys. These valleys were formed by the advancing Pleistocene glaciers that scoured out valleys in the surficial bedrock. Later, as the glaciers melted and retreated, these valleys were filled in with glacial drift. As illustrated in Figure 5A, a buried valley is located approximately four miles southeast of the Base.

HMTC

Adapted From:
Leow (1985)

Figure 5A.
Drift and Lake Deposit Isopach Map for the Ohio Air National Guard Base and Adjacent Vicinity.



As illustrated in Figure 4, the bedrock underlying glacial drift and lake deposits at the Base is the Upper Silurian age Greenfield Formation. The Greenfield as well as the underlying Middle Silurian age Lockport are composed of fine to coarse crystalline dolomite. A more detailed description of these formations is shown in Figure 3.

STATION:

The surficial sediments (0 - 20 feet below the land surface) at the Station, like those of the Base, consist of lake sediments that were deposited by Lake Erie. Soil borings drilled at the Station indicate that these sediments are composed of fine- to coarse-grained quartz sand with small amounts of silt and clay.

As at the Base, glacial drift underlies lake deposits at the Station and throughout Ottawa County. As illustrated in Figure 5B, glacial drift thickness at the Station and in its immediate vicinity ranges from 20 to 50 feet. The thicker sections of glacial drift (drift thickness greater than 100 feet) are associated with buried glacial valleys.

The bedrock that underlies the surficial lake deposits and glacial drift at the Station is the Upper Silurian age Tymochtee Formation. Lithologically, the Tymochtee is described as a grayish-brown, microcrystalline dolomite. A more detailed description of the Tymochtee, as well as the underlying Greenfield, Lockport, and Rochester Formations, is shown in Figure 3.

C. Soils

BASE:

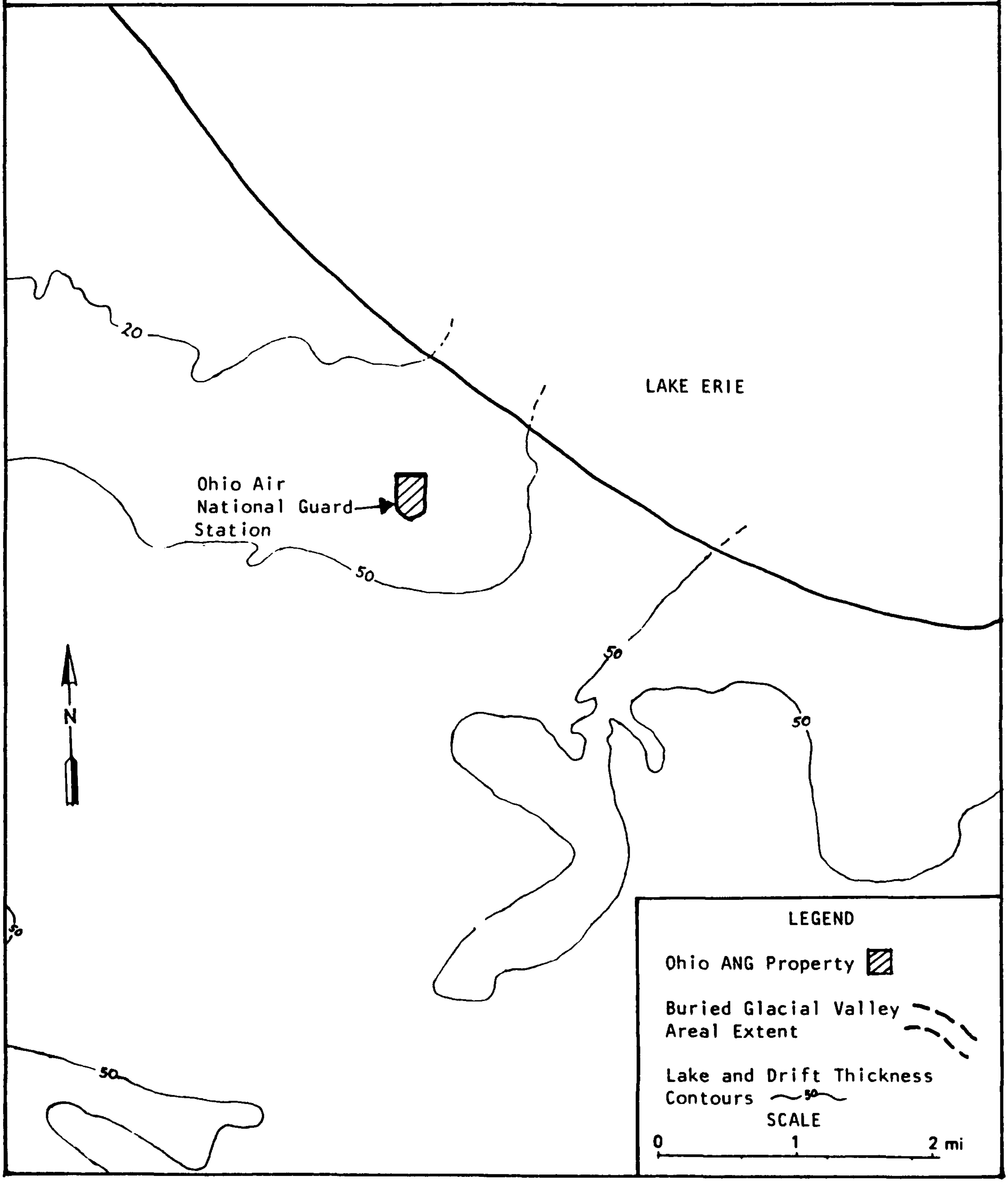
According to the USDA Soil Survey of Lucas County, the soil at the Base consists of Udorthents loam, Ottokee fine sand, and Granby loamy fine sand (Figure 6A). The permeability of these soils is high, 6.0 to 20.0 inches per hour (4.24×10^{-3} to 1.41×10^{-2} cm/sec).

The Udorthents soil consists of nearly level to strongly sloping, loamy soil material in cut and fill areas. The soil in this unit generally consists of mixed organic and inorganic material overlain by a layer of

HMTC

Adapted From:
Larsen (1984)

Figure 5B.
Drift and Lake Deposit Isopach Map for the Ohio Air National Guard Station and Adjacent Vicinity

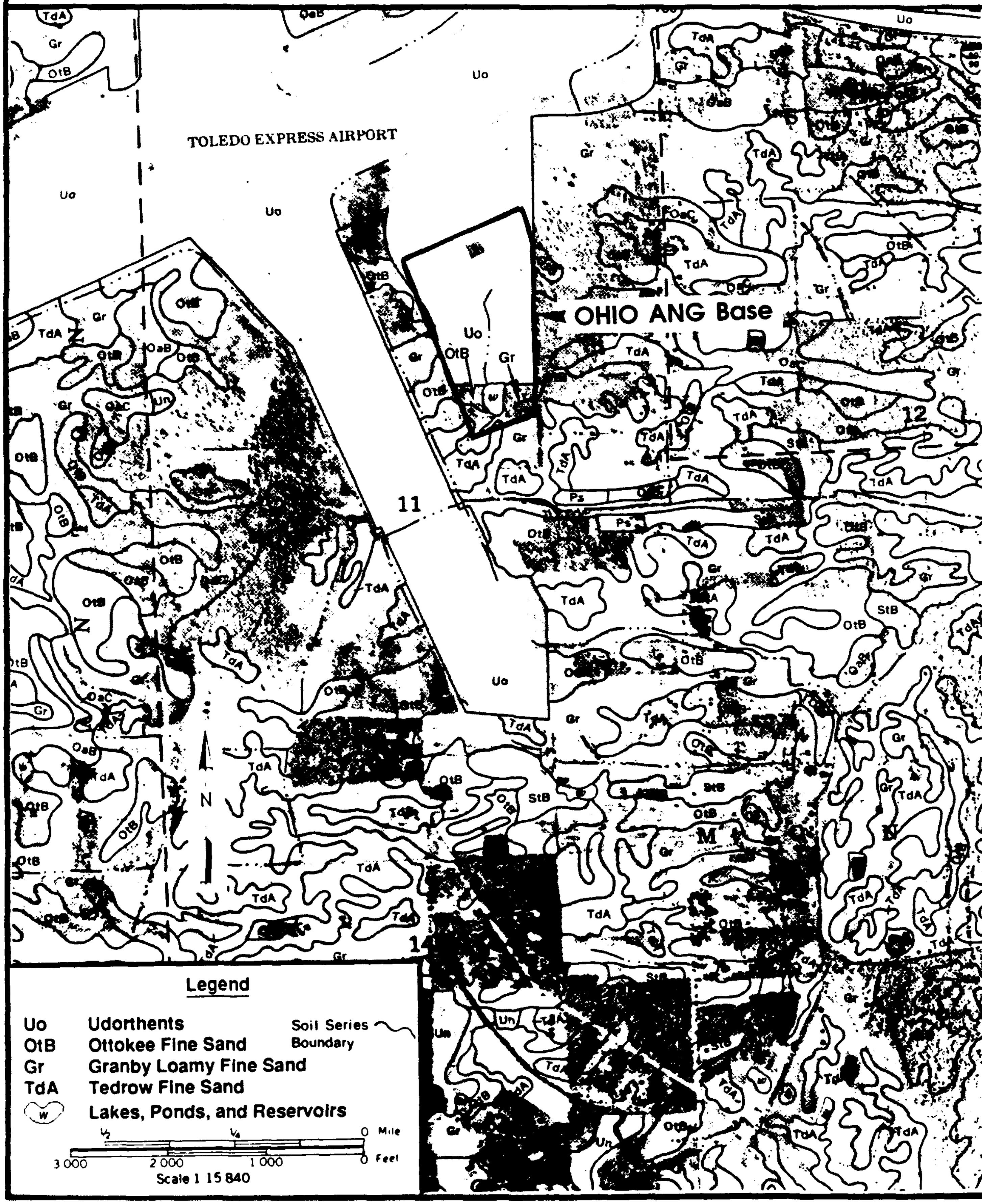


HMTC

Source: USDA Soil Survey of Lucas County, Ohio (1977).

Figure 6A.

Soil Map of the Ohio Air National Guard and Vicinity.



loamy soil material about two feet thick. There are some pits in this map unit, mainly near the Ohio Turnpike and Interstate Highways. In these areas, the surface layer, subsoil, and part of the substratum have been removed; the remaining soil material is calcareous clay and silty clay loam.

Correspondence with the Ohio Geological Survey indicated that sand dunes are quite prevalent at the Base and in its immediate vicinity. These dunes develop in the Ottokee fine-grain sand. The Ottokee fine sand is a moderately well-drained soil with surface topography consisting of broad beach ridges and oval sand dunes. The areas range from 2 to 50 acres. The surface layer is dark brown fine sand about 9 inches thick. The subsoil extends to a depth of about 51 inches. It is yellowish-brown, loose fine sand in the upper part; in the lower part, it is mottled, light brownish-grey and pale brown, very friable fine sand that has thin bands of strong brown, very friable loamy sand.

The Granby soil is a highly permeable soil on outwash plains. It is in irregularly shaped areas on broad flats and in long, narrow, concave areas. The areas range from 2 to 200 acres. This soil receives runoff from adjacent, higher-lying soils and is subject to ponding. The surface layer is black, loamy fine sand about 12 inches thick. The subsoil extends to a depth of about 27 inches. The upper part is mottled, dark gray, and very friable fine sand. The lower part is mottled, grayish-brown, and loose fine sand.

Soil borings have been drilled at the Base to evaluate subsurface conditions during the construction of Base facilities. These borings, which were drilled to a maximum depth of 20 feet, indicate that the surficial material (0 - 2 feet below land surface) is brown fine- to coarse-grained sand with traces of silt and clay. The underlying sediments (2 to 20 feet) were described as gray fine- to coarse-grained sand with traces of clay and silt. Additional information about soil borings at the Base is included in Appendix E.

For the purposes of assigning Hazard Assessment Scores to sites located on the Base, it was assumed that soil permeability was from quantity 10^{-4} to 10^{-2} cm/sec (USDA, 1980).

STATION:

Information from soil borings in the area of Buildings 200 and 220 indicates the surface soil to be gray, brown silty clay with small amounts of sand. These surfical soils were found at depths of about one-half foot beneath the concrete and ranged in thickness from one-half foot to 10 feet. The subsoil, which was observed at the interval of 10 - 25 feet below land surface, is composed of silty sand, sand, and gravel. Additional information about soil borings at the Station is included in Appendix E.

Correspondence with the USDA, SCS indicated that the surficial soils at the Station are the Toledo Silty Clay and the Udorthents soil series (Figure 6B). The surface layer of Toledo Silty Clay is a very dark grayish-brown, firm silty clay about seven inches thick. The subsoil is dark gray and mottled firm clay about 41 inches thick. The substratum to a depth of about 60 inches is dark grayish-brown, mottled, firm silty clay. The subsoil is slightly acidic or neutral, and the organic content is high (USDA, 1985).

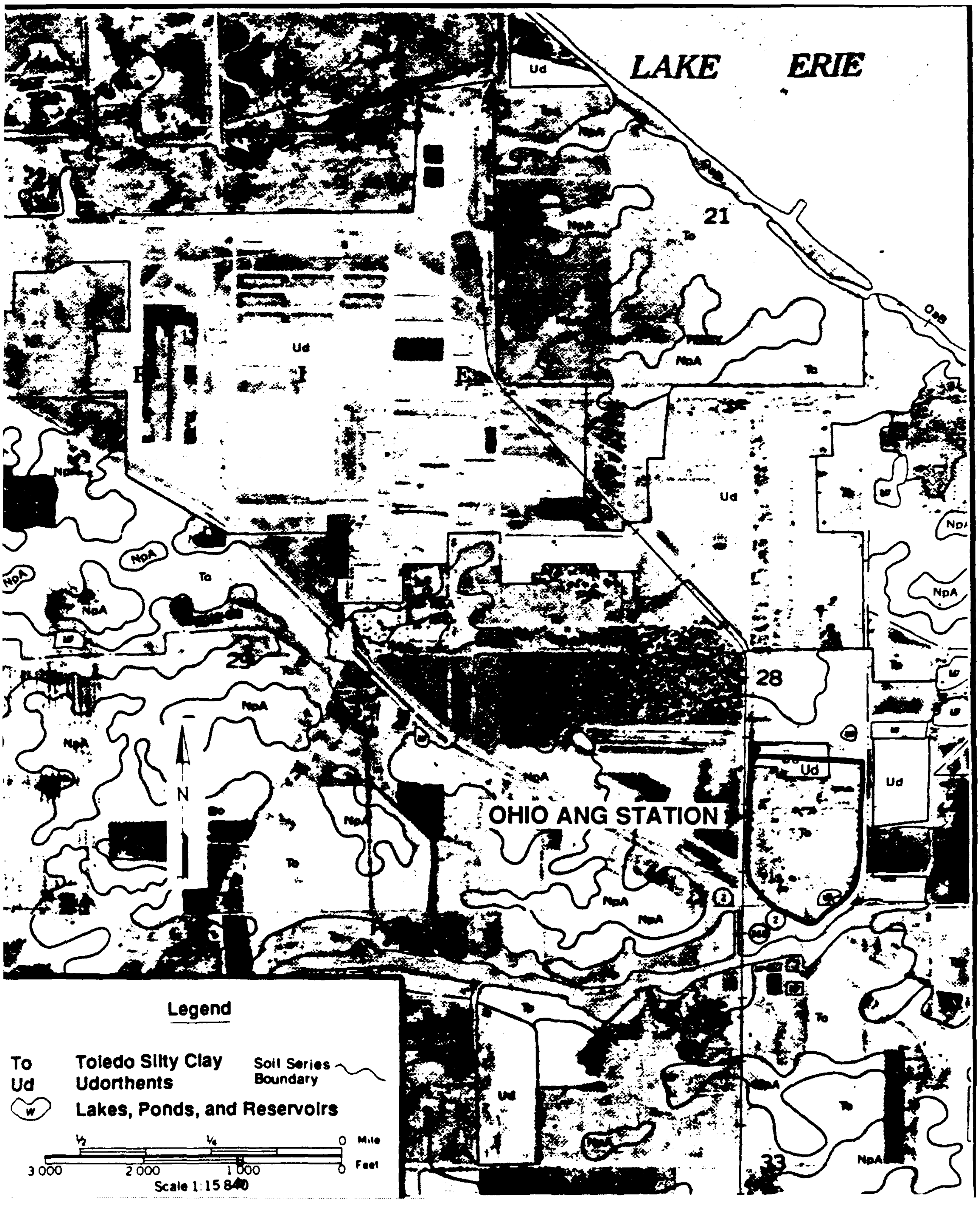
Udorthents soil occurs on gently sloping uplands in cut and fill areas. Earthmoving and grading have obliterated or mixed the original surface layer, subsoil, and substratum. The remaining soil material typically is similar to the subsoil and substratum of adjacent soils. The upper 60 inches is firm and dense clay loam, clay, or silt loam. Runoff is medium or rapid. A seasonal high water table occurs in depressed or bowl-shaped areas.

D. Hydrology

Surface Water

BASE:

The Base lies in the Maumee River drainage basin. The nearest major surface water to the Base is Swan Creek, which flows from the western portion of Lucas County towards the Maumee River, the eastern boundary of the county. Swan Creek is three miles south of the Base at its nearest point. Storm drainage from the northwestern portion of the Base flows into the drainage ditch lying outside the western boundary of the Base. Storm drainage from the eastern portion of the Base flows



LAKE ERIE
21
28
29
33
OHIO ANG STATION
Ud
To
NpA
OaB
N
Legend
To Toledo Silty Clay
Ud Udorthents
Soil Series Boundary
Lakes, Ponds, and Reservoirs
½ ¼ 0 Mile
3 000 2 000 1 000 0 Feet
Scale 1:15 840

into the drainage ditch lying inside the eastern boundary of the Base. Figure 7 shows drainage from the Base. These drainage ditches combine outside the Base boundaries and eventually drain into Swan Creek to the south.

STATION:

The Station lies in the Lower Portage River drainage basin. The Portage River is located approximately one mile south of the Station and flows into Lake Erie approximately three miles east of the Station.

Surface water at the Station is collected in a series of drainage swales, storm drains, and storm sewers (Figure 8). The majority of the surface water that flows into the Station's storm sewer system flows to a pump station at the Station's southeastern boundary. A small portion (area south of Building No. 9) flows into an on-site, unnamed, one-half acre pond. The overflow from this pond flows into the previously described pump station. The Station's surface water is pumped off-site and discharged into an open drainage ditch that joins Lacarpe Creek approximately 300 feet from the Station's southeastern boundary. Lacarpe Creek flows into Lake Erie approximately 1 - 1.5 miles east-northeast of the Station's eastern boundary.

Groundwater

BASE:

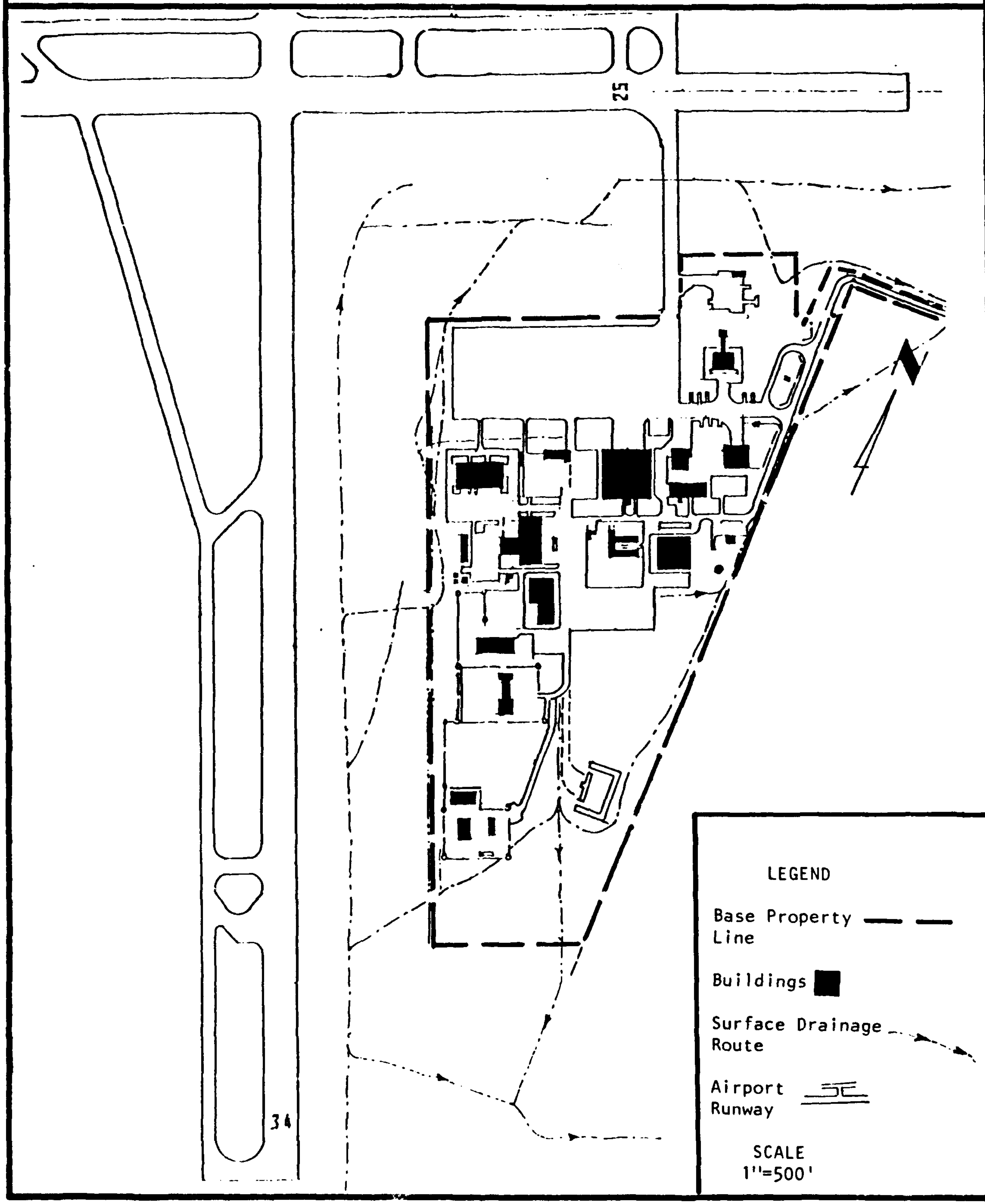
Adequate supplies of groundwater for domestic use are available from the sand and gravel deposits found at depths up to 100 feet. These water-bearing sand and gravel deposits occur within buried glacial valleys. Isopach contours mapping the thickness of the surficial, unconsolidated sediments show that there are no buried glacial valleys immediately underlying the Base. However, as illustrated in Figure 5A, a buried glacial valley is located approximately four miles southeast of the Base. Another buried valley is possibly located approximately five miles southwest of the Base.

The bedrock is capable of good groundwater production. Yields of as much as 300 gallons per minute (GPM) are obtained from wells drilled to depths between 150 and 500 feet in the limestone and dolomite, generally

HMTC Source: 180th TFG Civil Engineering.

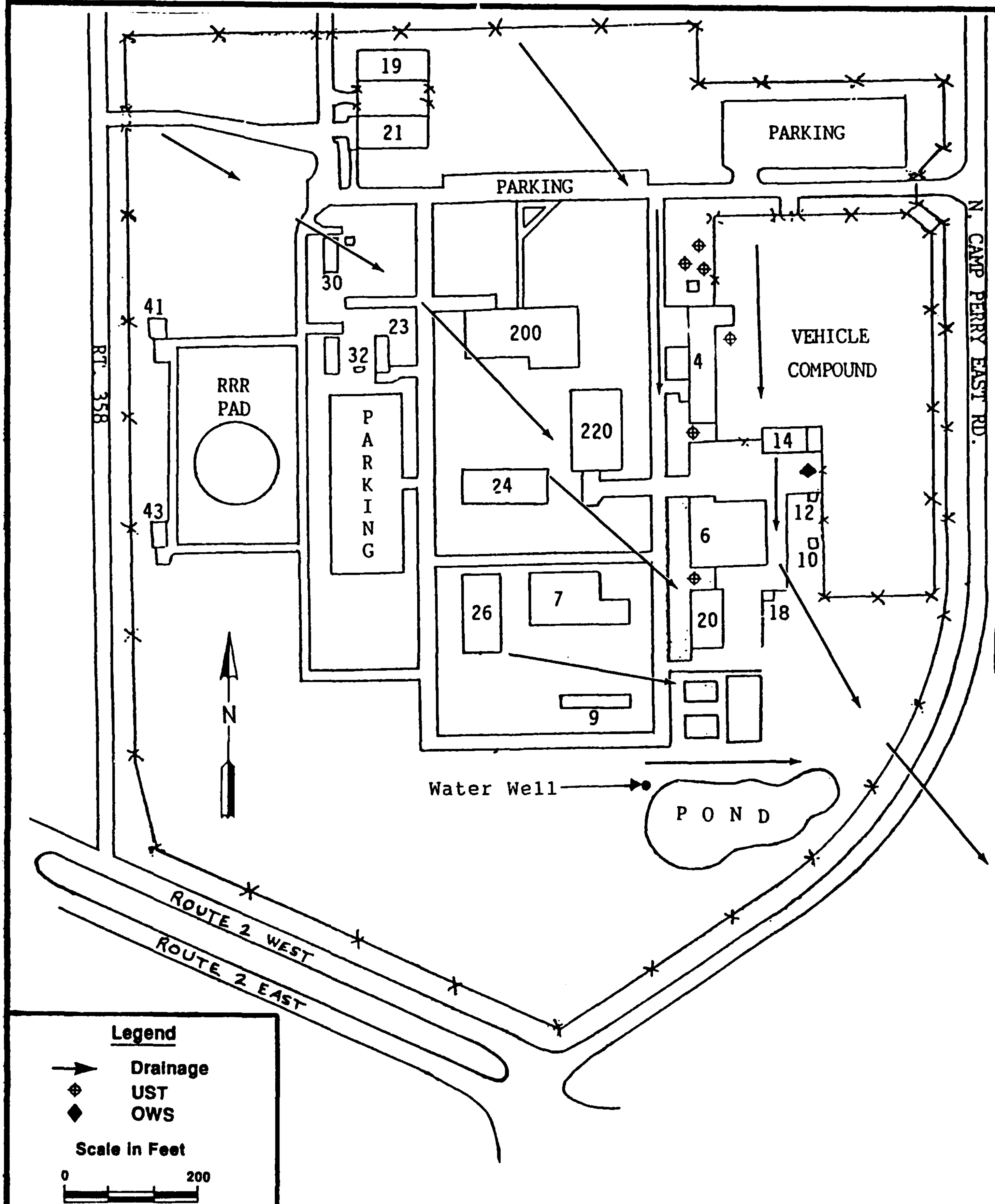
Figure 7.

Surface Drainage Map of the 180th TFG, Ohio Air National Guard, Toledo Express Airport, Swanton, Ohio.



HMTC Source: 200th RHCES, Ohio ANG. Camp Perry ANG Station.

Figure 8.
Base Map of the 200th RHCES, Ohio Air National Guard, Camp Perry ANG Station, Port Clinton, Ohio.



in the Silurian strata. Water occurs in cracks, crevices, and solution channels, and the yield from a well is proportional to the number of such openings intercepted by the well. Formations penetrated by the test wells (Figure 9) in Area 2 include the Raisin River, Tymochtee, Greenfield, Lockport, and in a few cases, the Pre-Lockport Formations. In the western portion of the area, the bedrock is Raisin River, and in the eastern portion, it is generally the Tymochtee Formation.

Groundwater aquifers, which occur in the Silurian and Devonian age bedrock, are hydrologically connected and are recharged by shallow groundwater within the surficial, unconsolidated lake and glacial sediments. However, wells along the northern boundary of Area 2 should receive recharge from Lake Erie since the formations in which they are developed underlie and are in direct contact with the lake (Ohio Department of Natural Resources, 1970).

The water table has been penetrated on-Base at depths ranging from one to three feet below the land surface. A USGS test well, which was drilled to a depth of seven feet, is located approximately 50 feet north of Building 134. This well is used to monitor the water table.

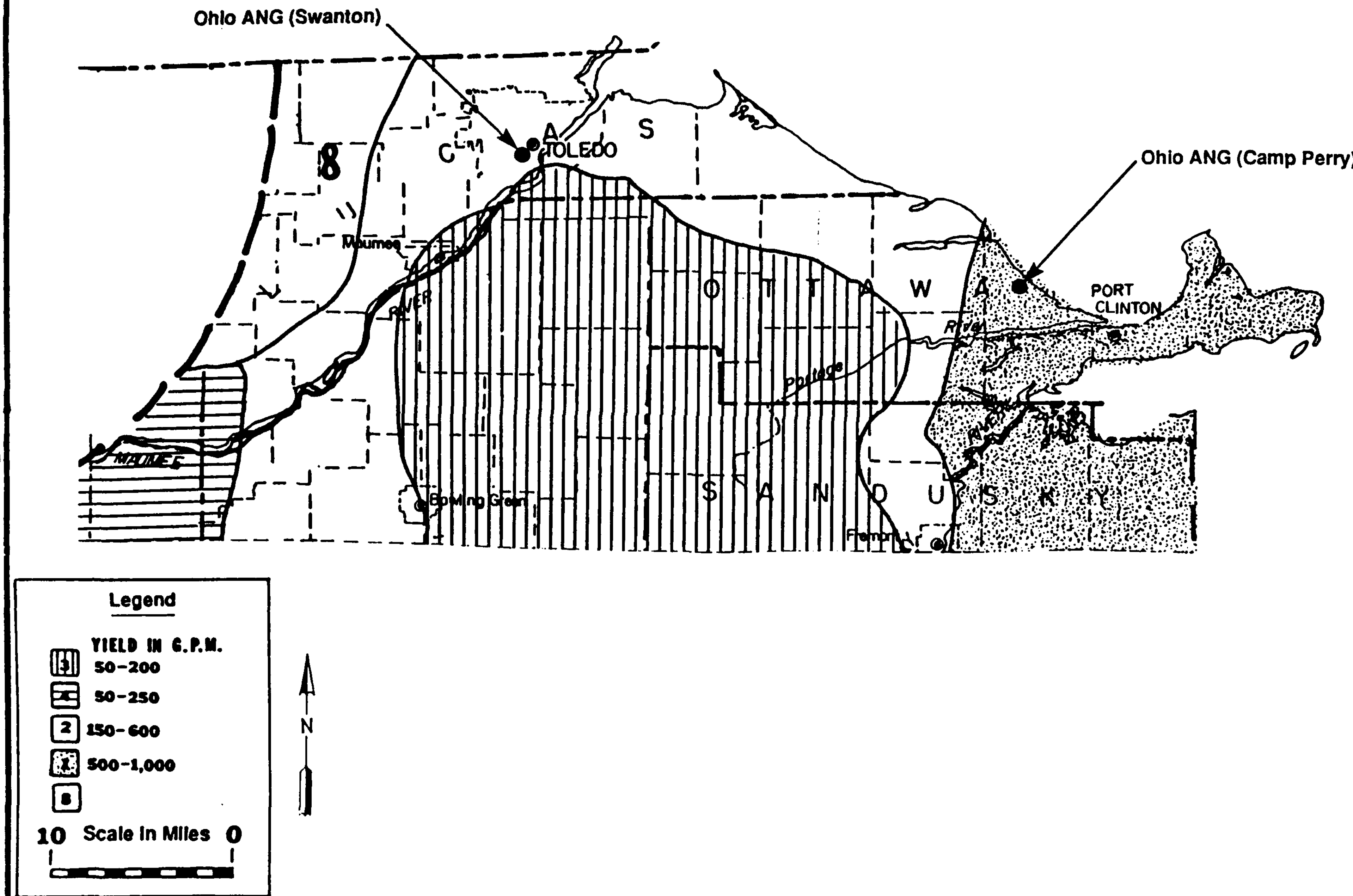
The Base uses well water from an on-site well that is screened at a depth of approximately 210 feet. This well is located in Building 110 (Base pump house). The yield for the Base's potable water well has been tested at 150 GPM.

Groundwater samples have been collected from the Base's on-site potable water well and tested for groundwater quality. These tests showed the following concentrations: chloride 43.7 milligrams per liter (mg/l), total hardness 555 mg/l, calcium hardness 260 mg/l, Magnesium 184 mg/l, Iron 0.459 mg/l, Potassium 6.25 mg/l, Sodium 214.25 mg/l, Sulphates 690 mg/l, and total solids 1398.7 mg/l. Groundwater from the Base's water well is softened by using a sodium ion-exchange treatment before consumption.

Correspondence with the State of Ohio, Department of Natural Resources indicated that the majority of potable water wells in the vicinity of the Base and Toledo Express Airport tap the Lockport aquifer for a domestic as well as a municipal and industrial water source.

HMTC Source: Ground Water for Planning in Northwest Ohio, 1970.

Figure 9.
Hydrologic Map Showing Potential Yields of Wells Developed in the Carbonate Rock Aquifer



Domestic wells tap the Lockport aquifer at depths of 75 to 125 feet below the land surface. These wells commonly yield from 10 to 50 GPM. Industrial, commercial, or municipal wells that require a larger water supply tap the Lockport aquifer at depths ranging from 100 to 500 feet below land surface. The large production wells commonly yield from 100 to 500 GPM.

STATION:

The Station is located in the lower portion of the Lower Portage River drainage basin. Some shallow wells are found in Ottawa County in the blanket of predominantly clay glacial drift that averages less than 20 feet thick. These wells yield adequate supplies for domestic use.

The bedrock is the principal water-bearing horizon in Ottawa County. Water is contained in fractures, joints, and bedding planes of limestone and dolomite. These rock crevices are often enlarged by solution and may store sizeable quantities of water. The number, size, and shape of these water-storing openings are quite variable from one location to the next, and consequently, the yields of wells in limestone or dolomite have a rather wide range. Figure 9 shows yields of well development in northwest Ohio. Most of the water in the wells in Area 1 is encountered in the upper few feet, or weathered portion, of the bedrock, regardless of the formation. The Station is situated within Area 1, the region with the highest potential yields. The thickness of the overburden ranges from 19 to 95 feet with an average of 65 feet. The uppermost formation in the majority of the wells is the Tymochtee, with the exception of the wells along the southeast boundary of the area. These wells encountered the Delaware, Columbus, and Raisin River formations. Formations penetrated by wells in this area include the Delaware, Columbus, Raisin River, Tymochtee, Greenfield, and the Lockport dolomites. As is true of the Base, the source of water and recharge to wells developed in this area are the unconsolidated lake and glacial sediments overlying the bedrock (Ohio Department Natural Resources, 1970). The majority of the bedrock wells in the basin are drilled for farms or private dwellings. These wells have depths of 50 to 125 feet and usually supply from 15 to 40 gallons per minute. Extensive test drilling is often required to locate and develop suitable, high capacity

wells for municipal or industrial use. Yields of 100 to 300 gallons per minute have been noted for industrial and municipal wells at depths of up to 350 feet (Ohio Department of Natural Resources, 1962).

The water supply for the Station is municipal water, which is purchased from the Camp Perry Army National Guard. The Army National Guard pumps its water directly from Lake Erie. However, a 50 feet deep water well is located at the Station. This well is located approximately 100 feet northwest of the 1/2 acre, on-site pond (Figure 10). This well was drilled as a civil engineering exercise, was never used as a potable water source, and is currently capped.

E. Critical Environments

BASE:

According to the Ohio Department of Natural Resources - Division of Wildlife, there are no endangered or threatened species of flora or fauna within a 1-mile radius of the Base. Furthermore, there are no critical habitats, wetlands, or wilderness areas within a 1-mile radius of the Base.

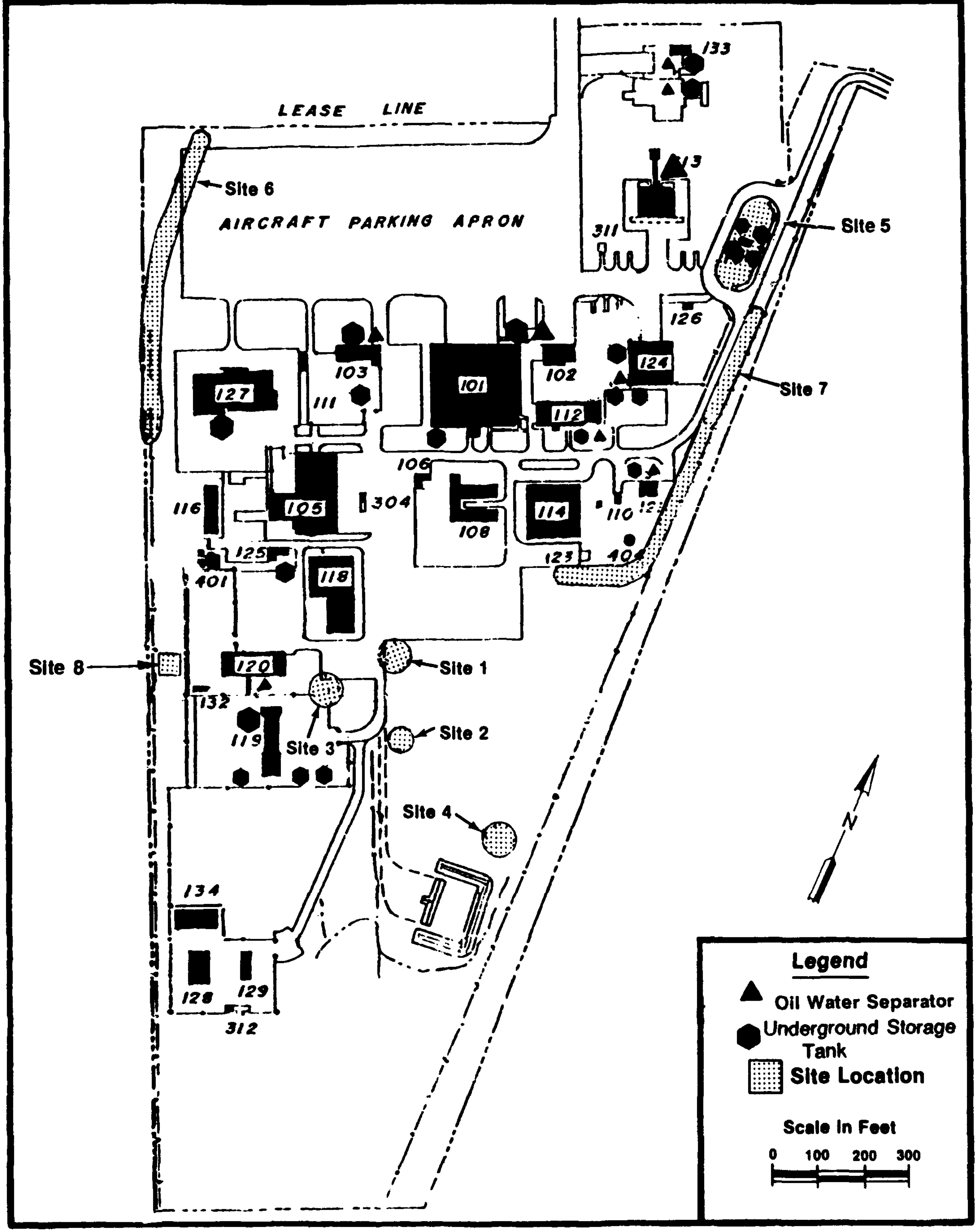
STATION:

According to the Ohio Department of Natural Resources - Division of Wildlife, there are no endangered or threatened species of flora or fauna within a 1-mile radius of the Station. Furthermore, there are no critical habitats or wilderness areas within a 1-mile radius of the Station.

However, there are wetlands adjacent to Camp Perry to the east and west. These areas are designated as the Ottawa National Wildlife Refuge.

Adapted from:
Base Development Plan (1986).

Figure 10.
Site Map of the 180th TFG, Toledo Express Airport, Ohio Air National Guard, Swanton, Ohio.



IV. SITE EVALUATION

A. Activity Review

BASE:

A review of Base records and interviews with Base personnel resulted in the identification of specific operations at the Base in which the majority of industrial chemicals are handled and hazardous wastes are generated. A total of 14 past and present Base personnel with an average of 16 years experience was interviewed. These personnel were representative of Civil Engineering; Aircraft Maintenance; Facilities Maintenance; Vehicle Maintenance; Corrosion Control; Aerospace Ground Equipment (AGE) Maintenance; Petroleum, Oils, and Lubricants (POL) Management; Photography Lab; Nondestructive Inspection (NDI); Power Production; Flightline; Reproduction and Reclamation; Wheel and Tire Shop; Avionics; Carpentry Shop; Electrical Shop; Clinic; and Battery Shops. Table 1A summarizes these major operations for the Base, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal practices for the wastes. Based on the information gathered, any operation that is not listed in Table 1A has been determined to produce negligible quantities of wastes requiring disposal.

STATION:

A review of Station records and interviews with Station personnel resulted in the identification of specific operations at the Station in which the majority of industrial chemicals are handled and hazardous wastes are generated. A total of four past and present Station personnel with an average of 17 years experience was interviewed. These personnel were representative of Equipment and Pavement and the Motor Pool. Table 1B summarizes these major operations for the Station, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal practices for the waste. Based on the information gathered, any operation that is not listed in Table 1B has been determined to produce negligible quantities of wastes requiring disposal.

Table 1A. Hazardous Material/Hazardous Waste Disposal Summary: 180th TFG, Ohio Air National Guard, Swanton, Ohio

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Aircraft Maintenance Bldg. No. 101	PD-680	25	|---FTA/CONTR/GRND---|---CONTR---|-DRMO-| (1960–1988)
	Strippers (Methyl Ethyl	10+	|---FTA---|---CONTR/GRND---------| (1960–1983)
	Ketone, Methyl Isopropyl		
	Ketone		|---FTA/GRND/STORM/OWS---|---OWS/CONTR--| (1960–1988)
	Synthetic Turbine Oil	10	
	7808 Oil	10+	|--FTA--------|CONTR---|GRND-FTA--|GRND-OWS|--CONTR--| (1950–1988)
	Hydraulic Oil	25	|--FTA--------|OWS/FTA/CONTR/GRND/LNDFL--CONTR| (1950–1983)
Aerospace Ground Equipment Maintenance (Age) Bldg. No. 103	Engine Oil	200	|----------------CONTR----------------| (1960–1988)
	Hydraulic Oil	100	|----------------CONTR----------------| (1960–1988)
	Paint Strippers/Thinners	20	|----------------OWS-----------------| (1960–1988)
	PD-680	10	|----------------CONTR----------------| (1960–1988)
	Turbine Oil	30	|----------------CONTR----------------| (1960–1988)
	Battery Acid	15	|-----GRND-----|----------CONTR---------| (1960–1988)
	Methyl Ethyl Ketone	5	|----------------CONTR----------------| (1960–1988)

<u>Key</u>:

CONTR - Disposed of through Hazardous Waste Contractor.
FTA - Burned at Fire Training Area.
GRND - Disposed of by dumping on ground.
LNDFL - Landfilled offsite.
OWS/CONTR - Disposed of in oil water separator that is pumped out by a contractor.
SAN - Disposed of in drains leading to the sanitary sewer.
STORM - Disposed of in drains leading to the storm sewer.

Table 1A. Hazardous Material/Hazardous Waste Disposal Summary: 180th TFG, Ohio Air National Guard, Swanton, Ohio (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Vehicle Maintenance Bldg. No. 119	Engine Oil	450	(1960) |------FTA------------|------CONTR------| (1988)
	PD-680	50	(1980) |-----OWS-----| (1988)
	Ethylene Glycol	150	(1960) |---------FTA--------|--------OWS-------| (1988)
	Lubricating Oil	5	(1960) |---------FTA--------|
	Hydraulic	55	(1960) |---------FTA--------|-------CONTR------| (1988)
	Transmission Fluid		
	Brake Fluid	10	(1970) |-------------OWS---------| (1988)
	Diesel Fuel	25	
	Gasoline	20	(1980) |-----OWS-----| (1988)
Non-Destructive Inspection (NDL) Bldg. No. 112	Methyl Isobutyl Ketone	20	(1960) |----------------DRMO-----------------| (1988)
	Penetrant	40	(1960) |----------------DRMO-----------------| (1988)
	Emulsifier	40	(1960) |----------------DRMO-----------------| (1988)
	Developer	20	(1960) |--------------SIL REC----------------| (1988)
	Fixer	20	(1960) |--------------SIL REC----------------| (1988)

<u>Key</u>:

CONTR - Disposed of through Hazardous Waste Contractor.
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OWS/CONTR - Disposed of in oil water separator that is pumped out by a contractor.
SAN - Disposed of in drains leading to the sanitary sewer.
STORM - Disposed of in drains leading to the storm sewer.

Table 1A. Hazardous Material/Hazardous Waste Disposal Summary: 180th TFG, Ohio Air National Guard, Swanton, Ohio (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Weapons Maintenance Bldg. No. 111	PD-680	50	
	Acetone	80	|-----GRND--------|
	Trichloroethylene	50	|-----GRND--------|
	Gasoline	200	|-----STORM-------|
	Thinners/Lacquers	Spraycans	|-----------LNDFL----------|
Corrosion Control Inspection (NDL) Bldg. No. 124	Thinners	200	|----------FTA/DRMO-----------|---DRMO---|
	Paint Stripper	50	|----------------DRMO-----------------|
	Lacquer	50	|----------FTA/DRMO-----------|---DRMO---|
	Methyl Ethyl Ketone	200	|----------FTA/DRMO-----------|---DRMO---|
	Polyurethane Paint	50	|---------------DRMO--------------------|
Paint Shops Bldg. No. 106	Thinners	40	|---------FTA------------|
	Methanol	8	
	Paint Containers (residual)	100 each	|-----------------LNDFL----------------|

Key:

CONTR - Disposed of through Hazardous Waste Contractor.
FTA - Burned at Fire Training Area.
GRND - Disposed of by dumping on ground.
LNDFL - Landfilled offsite.
OWS/CONTR - Disposed of in oil water separator that is pumped out by a contractor.
SAN - Disposed of in drains leading to the sanitary sewer.
STORM - Disposed of in drains leading to the storm sewer.

Table 1A. Hazardous Material/Hazardous Waste Disposal Summary: 180th TFG, Ohio Air National Guard, Swanton, Ohio (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 – 1960 – 1970 – 1980 – 1988
Paint Shops (Continued) Bldg. No. 106	Acetone	100	1960–1988: DRMO
	Strippers (Methyl Ethyl Ketone)	10	| (1960)
	Stripper Residue	20	1960–1988: LNDFL
Energy Plant Bldg. No. 101	Boiler Feedwater	2	1960–1988: SAN
Machine Shop Bldg. No 101	Metal Cutting Oils	50	1970–1988: DRMO
Battery Shop Bldg. No 103	Used Batteries	20	1960–1988: DRMO
	Battery Acid	30	1960–1988: NEUTR SAN

<u>Key</u>:

CONTR - Disposed of through Hazardous Waste Contractor.
FTA - Burned at Fire Training Area.
GRND - Disposed of by dumping on ground.
LNDFL - Landfilled offsite.
OWS/CONTR - Disposed of in oil water separator that is pumped out by a contractor.
SAN - Disposed of in drains leading to the sanitary sewer.
STORM - Disposed of in drains leading to the storm sewer.

Table 1A. Hazardous Material/Hazardous Waste Disposal Summary: 180th TFG, Ohio Air National Guard, Swanton, Ohio (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Photograph Lab Bldg. No 101	Developer	77	1950–1988: SAN
	Fixer	36	1950–1971: SAN; 1971–1988: SIL REC
	Kodak E-3	6	1950–1961: SAN
	Kodak E-4	12	1960–1972: SAN
	Kodak E-6	12	1970–1988: SAN
Propulsion Shop Bldg. No. 112	PD-680	100	1970–1980: OWS
	Carbon Cleaner	5	1970–1980: OWS; 1980–1988: CONTR
	7808 Oil	200	1981–1988: CONTR

Key:

CONTR - Disposed of through Hazardous Waste Contractor.
FTA - Burned at Fire Training Area.
GRND - Disposed of by dumping on ground.
LNDFL - Landfilled offsite.
OWS/CONTR - Disposed of in oil water separator that is pumped out by a contractor.
SAN - Disposed of in drains leading to the sanitary sewer.
STORM - Disposed of in drains leading to the storm sewer.

Table 1B. Hazardous Material/Hazardous Waste Disposal Summary: 200th RHCES, Ohio Air National Guard, Camp Perry ANG Station, Port Clinton, Ohio

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1970 — 1980 — 1988
Motor Pool Bldg. No. 4	PD-680	60	|-----------------CONTR---------|-------DRMO--------|
	Combined waste oils	50	|---------CONTR-----------|-----------DRMO----------|
	Paint stripper	10	|---------CONTR-----------|-----------DRMO----------|
	Used batteries	15	|---------------------ACID NEUTR------------------|
Equipment and Pavement Bldg. No. 14	Lacquer		|---------CONTR-----------|-----------DRMO----------|
	PD-680	10	|---------CONTR-----------|----------RECYCLE--------|

KEY:

ACID NEUTR - Disposed of by acid neutralization.
CONTR - Disposed of through private contractor.
CONTR/RECYCLE - Disposed of through a private contractor who recycles spent solvent.
DRMO - Disposed of through Defense Reutilization and Marketing Office.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

BASE:

Interviews with Base personnel and subsequent site inspections resulted in the identification of eight sites at the Base that are potentially contaminated with HM/HW. Figure 9 illustrates the locations of the identified sites at the Base.

A summary of the HAS for each scored site is listed in Table 2. Copies of the completed Hazardous Assessment Rating Forms are found in Appendix D. The objective of these assessments is to provide a relative ranking of sites suspected of contamination by HM/HW. The final rating score reflects specific components of the hazard posed by a specific site: possible receptors of the contamination (e.g., population within a specified distance of the site and/or critical environments within a 1-mile radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding). Descriptions of the eight sites follow:

Site No. 1 - Fire Training Area No. 1 (HAS-80)

Fire Training Area (FTA) No. 1 was located approximately 70 feet east of Building 118 in an area covered by open field (Figure 10). Training exercises were held at this location an average of 18 times per year from the late 1950s until 1966 when use of the FTA was discontinued due to the construction of a parking lot immediately to its north. Base personnel estimate that on the average, 250 to 500 gallons of flammable liquid were used per exercise at this FTA. Assuming that 70 percent of the flammable materials burned during fire training exercises, approximately 13,500 to 27,600 gallons of flammable liquid would have evaporated or seeped into the soil at this site. Prior to 1961, the major liquid used for fire training was AVGAS. In addition to AVGAS and JP-4, flammable liquids such as waste oil, PD-680, and thinners from Base shops were also ignited at the FTA.

Table 2. Site Hazard Assessment Scores (as derived from HARM: 180th TFG, Ohio Air National Guard, Swanton, Ohio)

Site Priority	Site No.	Site Description	Receptors	Waste Characteristics	Pathway	Waste Mgmt Practices	Overall Scores
1	1	FTA No. 1	59	100	80	1.0	80
2	2	FTA No. 2	59	100	80	1.0	80
3	3	FTA No. 3	59	60	80	1.0	66
4	4	FTA No. 4	59	60	80	1.0	66
5	5	POL Storage Area	59	60	80	1.0	66
6	6	Western Drainage Area	59	60	80	1.0	66
7	7	Eastern Drainage Area	59	60	80	1.0	66
8	8	FTA No. 5	59	60	80	1.0	66

FTA No. 1 consisted of a circular area surrounded by a berm. As part of fire training procedures, the Base soaked the ground with water prior to releasing and igniting the fuel. No signs of contamination were observed during the site inspection of the area where FTA No. 1 was located. However, a regular practice of conducting fire training exercises using hazardous wastes at an FTA creates a potential for ground and surface water contamination, and therefore, a HAS was applied.

<u>Site No. 2 - Fire Training Area No. 2</u> (HAS-80)

Fire Training Area No. 2 served as the major site for Base fire training between 1966 and 1978. As shown in Figure 10, it was located approximately 70 feet southwest of FTA No. 1. Fire training exercises at this area were discontinued briefly in the early 1970s due to problems controlling the burns. Base personnel estimate that approximately 250 to 500 gallons of flammable liquid were used per exercise and that fire training exercises were conducted approximately 18 times per year. Assuming that 70 percent of the flammable materials burned during fire training exercises, approximately 16,200 to 32,400 gallons of flammable liquid would have evaporated or seeped into the soil at this site. The majority of the fuel burned at this site was JP-4. However, small quantities of combustible liquid wastes such as oils, solvents, and strippers from the Base shops were also disposed of at the FTA.

FTA No. 2 was surrounded by a berm and was flooded with water prior to a fire training exercise. A circular area of distressed vegetation was observed during the site inspection of the area where FTA No. 2 was located. Closer examination revealed no soil discoloration. However, a regular practice of conducting fire training exercises using hazardous wastes at an FTA creates a potential for ground and surface water contamination, and therefore, a HAS was applied.

<u>Site No. 3 - Fire Training Area No. 3</u> (HAS-66)

Fire Training Area No. 3 was located inside of the fenced area where the Motor Pool (Building 119) now stands (Figure 10). This area was reportedly used

only once or twice in the early 1970s and then abandoned due to the proximity of the FTA to planned construction sites and complaints from the airport about smoke blowing across the runway.

The area where FTA No. 3 was located was covered with asphalt in 1977. A HAS was applied to this site, assuming a total of 500-1000 gallons of JP-4 was used for fire training exercises over the life of the site. Assuming 70 percent of the flammable materials were destroyed during fire training exercises, 150-300 gallons may have evaporated or seeped into the ground.

Site No. 4 - Fire Training Area No. 4 (HAS-66)

Fire Training Area No. 4 was located on the south side of the Base just north of the small arms range (Figure 10). This FTA was used for about 6 months in the early 1970s immediately after fire training was discontinued at FTA No. 3. This FTA proved to be unsatisfactory because the sandy soil at the site would not retain water so that the fuel could be floated prior to ignition. Assuming this FTA was used nine times, using 250 gallons per exercise, 2250 gallons of flammable materials may have been used at this site. And, if 70 percent burned, 675 gallons may have evaporated or seeped into the ground.

Site No. 5 - POL Storage Area (HAS-66)

POL facilities are located in the northeast corner of the Base. These facilities consist of four 25,000-gallon underground tanks north of Building 124 (Figure 10). These underground storage tanks were inspected in 1985 as part of a construction project. No leaks in the tank walls were detected; however, some soil contaminated by refueling was discovered and excavated for disposal elsewhere. Interviewees reported that numerous small spills have occurred at the POL area in the range of 200 to 300 gallons since the late 1950s. These spills may be responsible for the lack of vegetation that is apparent east of the POL area. The site was scored as a small quantity hazardous waste site.

Site No. 6 - Western Drainage Area (HAS-66)

The western drainage ditch runs parallel to the Base boundary along the northeastern edge of the aircraft parking apron (Figure 10) and receives storm drainage from the northwestern section of the Base property. This drainage includes effluent from the oil water separators (OWSs) that are not connected to the sanitary sewer system on this part of the Base. This drainage ditch shows signs of organic contamination. Organic contamination was also observed in the drainage area in front of the Hangar.

Site No. 7 - Eastern Drainage Area (HAS-66)

The eastern drainage ditch that parallels the eastern boundary of the Base receives storm drainage from the eastern portion of the Base. This site begins south of Building 114 and runs parallel to the Base boundary until it ends just east of Facility 126 (Figure 10). This ditch receives drainage from the POL facility as well as from the OWSs that are not connected to the sanitary sewer system on this part of the Base. During an inspection of this area, organic contamination was observed in the northern portion of this ditch. A reddish-brown discharge, probably resulting from backwash effluent from the water treatment operations conducted at Building 110, was also seen in the southern portion of the ditch.

Site No. 8 - Fire Training Area No. 5 (HAS-66)

During the mid 1980s, fire training took place on a concrete curbed burn pad (FTA No. 5) that is located west of Civil Engineering (Building 120). The location of this site is shown in Figure 9. The pad was used two or three times in the mid 1980s to burn a total of about 300 gallons of a mixture of waste oils and solvents pumped from shop oil water separators (OWSs). After the burns, any remaining liquids were drained to the storm drainage ditch adjacent to the burn pad.

STATION

An interview with Station personnel and a subsequent facility inspection resulted in no identifications of sites contaminated with HM/HW. Figure 8 is included as a base map.

Any identified site would have been assigned a HAS according to HARM. Although there are no sites at the Station, the methodology and guidelines have been included in Appendix C. The information for the Table 2 summary of HAS scores has been omitted since there are no sites. Appendix D, containing the Factor Rating Criteria and Hazard Assessment Rating Forms for the Station, has also been omitted.

The objective of such assessments is to provide a relative ranking of sites suspected of contamination from hazardous substances. The final rating score reflects specific components of a hazard posed by a specific site; possible receptors of the contamination (e.g., population within a specified distance of the site and/or critical environments within a 1-mile radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding).

C. Other Pertinent Information

BASE:

There are a total of 25 USTs and nine OWSs at the Base. Appendix E lists the locations and characteristics of the USTs and OWSs.

Since 1978, the majority of the fire training exercises have been conducted at the Toledo Fire Training Tower, a facility operated by the Toledo Fire Department. In addition, an off-base fire training area southwest of the Base along the north-south runway was used two or three times in conjunction with the Toledo-Lucas County Port Authority Fire Department.

The airport uses city water.

The Base is supplied by well water from an on-site well screened at a depth of approximately 210 feet. The Base operates its own water treatment and sewage

treatment plants. The outfall from the wastewater treatment plant discharges into a nearby drainage ditch.

No landfills or disposal areas have been operated on Base property.

The residential water supply in the vicinity of the Base is obtained primarily from local potable water wells. A relatively small number of residences receive municipal water.

There have never been any known leaks of PCB-contaminated oils on the Base property.

There have been no known radioactive disposal sites on Base property.

STATION:

There are a total of six USTs and three OWSs at the Station. Appendix E lists the locations and characteristics of the USTs and OWSs.

The Station receives its water supplies from Camp Perry (Army National Guard) and discharges effluent to their sewage treatment facility.

No landfills or disposal areas have been operated on Station property.

On August 14, 1983, approximately one gallon of oil containing PCB (224 ppm) was spilled during repair of an airfield lighting regulator. The spill occurred on pavement. It was contained and cleaned per instructions of the Bowling Green office of the Ohio EPA. There have been no other known leaks of PCB-contaminated oils on the Station property.

There have been no known radioactive disposal sites on Station property.

V. CONCLUSIONS

BASE:

Information obtained through interviews with 14 past and present Base personnel, a review of Base records, and field observations has resulted in the identification of eight potentially contaminated disposal and/or spill sites on Base property. These sites are as follows:

Site No. 1 - Fire Training Area No. 1 (HAS - 80)

Site No. 2 - Fire Training Area No. 2 (HAS - 80)

Site No. 3 - Fire Training Area No. 3 (HAS - 66)

Site No. 4 - Fire Training Area No. 4 (HAS - 66)

Site No. 5 - POL Storage Area (HAS - 66)

Site No. 6 - Western Drainage Area (HAS - 66)

Site No. 7 - Eastern Drainage Area (HAS - 66)

Site No. 8 - Fire Training Area No. 5 (HAS - 66)

Each of these sites is potentially contaminated with HM/HW and each exhibits the potential for contaminant migration to groundwater and surface water. Therefore, these sites were assigned a HAS according to HARM.

STATION:

Information obtained through interviews with four past and present Station personnel, a review of Station records, and field observations has resulted in the conclusion that there are no potentially contaminated disposal and/or spill sites on Station property.

VI. RECOMMENDATIONS

BASE:

Further IRP investigation is recommended at each of the identified sites listed below:

Site No. 1 - Fire Training Area No. 1 (HAS - 80)

Site No. 2 - Fire Training Area No. 2 (HAS - 80)

Site No. 3 - Fire Training Area No. 3 (HAS - 66)

Site No. 4 - Fire Training Area No. 4 (HAS - 66)

Site No. 5 - POL Storage Area (HAS - 66)

Site No. 6 - Western Drainage Area (HAS - 66)

Site No. 7 - Eastern Drainage Area (HAS - 66)

Site No. 8 - Fire Training Area No. 5 (HAS - 66)

STATION:

No further IRP investigation is recommended.

GLOSSARY OF TERMS

ANNUAL PRECIPITATION - The total amount of rainfall and snowfall for the year.

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

ARCH [struc geol] - A broad, open anticlinal fold on a regional scale; usually a basement doming.

BASAL [adj] - Pertaining to, situated at, or forming the base; bottom.

BASIN - (a) A depressed area with no surface outlet; (b) A drainage basin or river basin; (c) A low area in the Earth's crust, of tectonic origin, in which sediments have accumulated.

BEACH RIDGE - A low, essentially continuous mound of beach or beach-and-dune material heaped up by the action of waves and currents on the back shore of a beach beyond the present limit of storm waves or the reach of ordinary tides.

BED [stratig] - The smallest formal unit in the hierarchy of lithostratigraphic units. In a stratified sequence of rocks, it is distinguishable from layers above and below. A bed commonly ranges in thickness from a centimeter to a few meters.

BEDDING [stratig] - The arrangement of sedimentary rock in beds or layers of varying thickness and character.

BEDDING PLANE - A planar or nearly planar bedding surface that visibly separates each successive layer of stratified rock from the preceding or following layer.

BEDROCK - A general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material.

BURIED VALLEY - A depression in an ancient land surface or in bedrock, now covered by younger deposits; especially a preglacial valley filled with glacial drift.

CALCAREOUS - Said of a substance that contains calcium carbonate.

CARBONATE - To impregnate or charge with carbon dioxide.

CAVERNOUS [speleo] - Said of an area or geologic formation, e.g. limestone, that contains caverns or caves.

CHANNEL - The bed where a natural body of surface water flows or may flow.

CLAY [soil] - A rock or mineral particle in the soil having a diameter less than 0.002 mm (2 microns).

CLAY [geol] - A rock or mineral fragment or a detrital particle of any composition smaller than a fine silt grain, having a diameter less than 1/256 mm (4 microns).

COARSE-GRAINED - Said of a soil or sediment in which gravel and/or sand predominates.

CONTAMINANT - As defined by Section 101(f)(33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CRACK [struc geol] - A partial or incomplete fracture.

CREEK - A term generally applied to any natural stream of water, normally larger than a brook but smaller than a river.

CREST [geomorph] - The highest point or line of a landform, from which the surface slopes downward in opposite directions.

CREVICE - A narrow opening or recess, as in a wave-eroded cliff.

CRITICAL HABITAT - The specific areas within the geographical area occupied by the species on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection.

DEPOSIT - Earth material of any type, either consolidated or unconsolidated, that has accumulated by some natural process or agent.

DEPOSITION - The laying, placing, or throwing down of any material.

DEVONIAN - A period of the Paleozoic era (after the Silurian and before the Mississippian), thought to have covered the span of time between 400 and 345 million years ago.

DOLOMITE [rock] - A carbonate sedimentary rock of which more than 50% by weight or by areal percentages under the microscope consists of the mineral dolomite, or a variety of limestone or marble rich in magnesium carbonate.

DRAINAGE BASIN - A region or area bounded by a drainage divide and occupied by a drainage system.

DRAINAGE CLASS [natural] - Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained - Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained - Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained - Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained - Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained - Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained - Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough periods during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained - Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

DRAINAGE DITCH - A long, narrow excavation artificially dug in the ground for conveying water for drainage.

DRAINAGE PATTERN - The configuration or arrangement in plain view of the natural stream courses in the area.

DRIFT [glac geol] - A general term applied to all rock material (clay, silt, sand, gravel, boulders) transported by a glacier and deposited directly by or from the ice, or by running water emanating from a glacier. Drift includes unstratified material (till) and stratified deposits.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection would present an overwhelming and overriding risk to man.

EROSION - The general process or the group of processes whereby the materials of the Earth's crust are loosened, dissolved, or worn away, and simultaneously moved from one place to another by natural agencies, but usually exclude mass wasting.

FINE [sed] - Very small particles, especially those smaller than the average in a mixture of particles of various sizes.

FLASHPOINT - The lowest temperature at which vapors of combustible liquids, especially fuels, will ignite.

FLAT [geomorph] - A general term for a level or nearly level surface or small area of land marked by little or no relief.

FORMATION - A lithologically distinctive, mappable body of rock.

FRACTURE [struc geol] - A general term for any break in a rock, whether or not it causes displacement, due to mechanical failure by stress. Fracture includes cracks, joints, and faults.

FRIABLE - (a) Said of a soil consistency in which moist soil material crushes easily under gentle to moderate pressure and coheres when pressed together; (b) Said of a rock or mineral that crumbles naturally or is easily broken, pulverized or reduced to a powder.

GLACIAL - (a) Of or relating to the presence and activities of ice or glaciers, (b) Pertaining to distinctive features and materials produced or derived from glaciers and ice sheets.

GLACIAL DRIFT - See DRIFT.

GLACIAL TILL - See TILL.

GLACIATION - The formation, movement, and recession of glaciers or ice sheets.

GLACIER - A large mass of ice formed, at least in part, on land by the compaction and recrystallization of snow, moving slowly by creep downslope or outward in all directions due to the stress of its own weight, and surviving from year to year.

GRAVEL - An unconsolidated, natural accumulation of rounded rock fragments resulting from erosion, consisting predominantly of particles larger than sand, such as boulders, cobbles, pebbles, granules or any combination of these fragments.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, December 11, 1981.)

HAS - Hazard Assessment Score - The score developed by using the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or

b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HORIZON [geol] - One of several lines or planes used as reference for observation and measurement relative to a given location on the Earth's surface and referred generally to a horizontal direction.

HUMID [climate] - Containing vapor or water; moist; damp.

IGNITABILITY - The ability of a substance to burn or catch fire.

INFILTRATION - The movement of water through soil or porous rock.

INORGANIC - Pertaining or relating to a compound that contains no carbon.

INTERBEDDED - Beds lying between or alternating with others of different character; esp. rock material laid down in sequence between other beds.

JOINT [struc geol] - A surface fracture or parting in a rock, without displacement.

JP-4 - A type of jet fuel.

KETONE - One of a class of organic compounds in which the carbonyl radical unites with two hydrocarbon radicals, i.e. acetone, methyl ethyl ketone.

LAKE - Any inland body of standing water occupying a depression in the Earth's surface, generally of appreciable size (larger than a pond) and too deep to allow land plants to take root across the expanse of water.

LAKE PLAIN - The nearly level surface making the floor of an extinct lake, filled in by well-sorted deposits from inflowing streams.

LIMESTONE - A sedimentary rock consisting primarily of calcium carbonate, primarily in the form of the mineral calcite.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal proportions of sand, silt, and clay particles, and usually containing organic matter.

LOAMY SAND - A soil containing 70-90% sand, 0-30% silt, and 0-15% clay.

LOAMY SOIL - A soil whose textures and properties are intermediate, between those of a coarse-textured or sandy soil and a fine-textured or clayey soil.

MEAN LAKE EVAPORATION - The total evaporation amount for a particular area; amount based on precipitation and climate (humidity).

MELTWATER - Water derived from the melting of snow or ice, especially in the stream flow in, under, or from melting glacier ice.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

MINERAL - A naturally occurring inorganic element or compound having an orderly internal structure and characteristic chemical composition, crystal form, and physical properties.

MOTTLED [soil] - a soil that is irregularly marked with spots or patches of different colors, usually indicating poor aeration or seasonal wetness.

NET PRECIPITATION - Precipitation minus evaporation.

ORGANIC - Pertaining or relating to a compound containing carbon, especially as an essential component.

OUTWASH PLAIN - A broad, gently sloping sheet of outwash deposited by meltwater streams flowing in front of or beyond a glacier, and formed by coalescing outwash fans.

PD-680 - A cleaning solvent composed predominately of mineral spirits; Stoddard solvent.

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

PLEISTOCENE - The first epoch of the Quaternary period; the Pleistocene began two to three million years ago and lasted until the start of the Holocene period some 8,000 years ago.

POND - A natural body of standing fresh water occupying a small surface depression, usually smaller than a lake and larger then a pool.

PONDING - The natural formation of a pond in a stream by an interruption of the normal stream flow.

POROUS - Having pores; permeable by fluids or light.

RADIOACTIVITY - Spontaneous nuclear disintegration of certain elements and isotopes with the emission of radiation, radiant energy capable of affecting living tissue.

RANGE - Any series of contiguous townships aligned north and south and numbered consecutively east and west.

RECHARGE - The process involved in the absorption and addition of water to the zone of saturation.

RIVER - A general term for a natural freshwater surface stream of considerable volume and a permanent or seasonal flow, moving in a definite channel toward a sea, lake, or another river.

SAND - A rock or mineral particle in the soil, having a diameter in the range 0.52 - 2.00 mm.

SAND DUNE - An accumulation of loose sand heaped up by the wind, commonly found along low-lying seashores.

SECTION - One of the 36 units of a subdivision of a township, representing a piece of land one mile square. See RANGE, TOWNSHIP.

SHALE - A fine-grained, detrital sedimentary rock, formed by the consolidation (especially by compression) of clay, silt, or mud.

SILT [geol] - A rock fragment or detrital particle smaller than a very fine sand grain and larger than coarse clay, having a diameter in the range of 0.004 to 0.063 mm.

SILT [soil] - (a) A rock or mineral particle in the soil, having a diameter in the range 0.002-0.005 mm; (b) A soil containing more than 80% silt-size particles, less than 12% clay, and less than 20% sand.

SILTY CLAY - A soil containing 40-60% clay, 40-60% silt, and less than 20% sand.

SILTY CLAY LOAM - A soil containing 27-40% clay, 60-73% silt, and less than 20% sand.

SILT LOAM - A soil containing 50-88% silt, 0-27% clay, and 0 - 50% sand.

SILURIAN - A period of the Paleozoic era, thought to have covered the span of time between 440 and 400 million years ago; also the corresponding system of rocks.

SLOPE - (a) Gradient; (b) The inclined surface of any part of the Earth's surface.

SOIL REACTION - The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests at pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as:

Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

SOIL STRUCTURE - The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are: platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

SOLUTION CHANNEL - Tabular or planar formation formed by solution in carbonate-rock terranes, usually along joints and bedding planes.

STRATA - Distinguishable horizontal rock layers separated vertically from other layers.

STRATIFIED - Formed, arranged, or laid down in layers or strata; especially said of any layered sedimentary rock or deposit.

SUBSTRATUM [soil] - Any layer beneath the solum (the upper part of a soil profile).

SUBSURFACE - Rock and soil material lying beneath the Earth's surface.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

SURFICIAL - Pertaining to, or occurring on, a surface. Syn: superficial.

TEMPERATE [climate] - Moderate as regards to temperature; free from extremes of heat or cold; mild.

TEST WELL [water] - A well dug or drilled in search of water.

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TILL - Dominantly unsorted and unstratified drift, generally unconsolidated, deposited directly by and underneath a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand and gravel, and boulders ranging widely in size and shape.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and manmade features.

TOWNSHIP - The unit of survey of the U.S. Public Land Survey, representing a piece of land that is bounded on the east and west by meridians approximately 6 miles apart and on the north and south by parallels six miles apart, and that is normally divided into 36 sections. Townships are located with references to a principal meridian and base line and are normally numbered consecutively north and south from the base line (e.g. "township 14 north"). Used in conjunction with Range.

TOXICITY - The degree of the intensity of a poison; toxicity can be evaluated using the rating scheme of Sax (1984):

Sax's Toxicity Ratings

0 = no toxicity (Low)

Substances that cause no harm under any conditions or substances that cause toxic effects under the most unusual conditions or by overwhelming doses.

1 = slight toxicity (LOW)

Substances that produce changes in the human body which are readily reversible and which will disappear following termination of exposure.

2 = moderate toxicity (Moderate)

Substances that may produce irreversible as well as reversible changes in the human body. These changes are not of such severity as to threaten life or to produce serious physical impairment.

3 - severe toxicity (High)

Substances that produce irreversible changes in the human body. These changes are of such severity to threaten human life or cause death.

UNCONFORMABLE - Said of strata or stratification exhibiting the relation of unconformity to the older underlying rocks.

UNCONFORMITY - A substantial break or gap in the geologic record where a rock unit is overlain by another that is not next in stratigraphic succession, such as an interruption in the continuity of a depositional sequence of sedimentary rocks or a break between eroded igneous rocks and younger sedimentary strata.

UNCONSOLIDATED - A sediment that is loosely arranged or whose particles are not cemented together, occurring either at the surface or at depth.

UPLAND - A general term for high land or an extensive region of high land.

UPLIFTS [tect] - A structurally high area in the crust, produced by positive movements that raise or upthrust the rocks, as in a dome or arch.

VALLEY - Any low-lying land bordered by higher ground, especially an elongate, relatively large, gently sloping depression of the earth's surface, commonly situated between two mountains or between ranges of hills and mountains, and often containing a stream or river with an outlet. It is usually developed by stream or river erosion, but can be formed by faulting.

WATER TABLE - The surface between the zone of saturation and the zone of aeration; that surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.

WETLANDS - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

WISCONSINAN - Pertaining to the classical fourth glacial stage of the Pleistocene epoch in North America, following the Sangamonian interglacial stage and preceding the Holocene.

BIBLIOGRAPHY

Janssens, A. Middle Devonian Formations in the Subsurface of Northwestern Ohio. Report of Investigation No. 78, 1970.

Larsen, Glen E. Drift Thickness of Ottawa County, Ohio. Open-File Map 215. Columbus, Ohio: Ohio Department of Natural Resources, Division of Geological Survey, 1984.

Leow, Jack A. Drift Thickness Map of Lucas County, Ohio. Open-File Map 242. Columbus, Ohio: Ohio Department of Natural Resources, Division of Geological Survey, 1985.

Michigan Basin Geological Society. Geology of the Lake Erie Islands and Adjacent Shores, 1971.

Ohio Department of Natural Resources, Division of Water. Map of Maumee River and Ten Mile Creek Basins Underground Water Resources, 1959.

Ohio Department of Natural Resources, Division of Water. Map of Lower Portage River and Muddy Creek Basins Underground Water Resources, 1962.

United States Department of Agriculture. Soil Survey of Lucas County, Ohio, 1980.

United States Department of Agriculture. Soil Survey of Ottawa County, Ohio, 1985.

United States Department of Defense. Defense Environmental Quality Program Policy Memorandum (DEQPPM81-5), June 1980.

United States Geological Survey, Lacarne Quadrangle, Ohio, 7-5 Minute Series (Topographic), photorevised 1980.

United States Geological Survey, Whitehouse Quadrangle, Ohio, 7-5 Minute Series (Topographic), photorevised 1980.

United States Government. National Oil and Hazardous Substances Contingency Plan. 47 Federal Register 31224-31235, July 16, 1982.

Appendix A

Resumes of Search Team Members

GRACE E. HILL

EDUCATION

B.S. (enrolled), Environmental Science, University of the District of Columbia
A.S., Marine Science, University of the District of Columbia, 1984

CERTIFICATION

Health & Safety Training Level C

EXPERIENCE

Seven years of experience in various environmental and hazardous waste disciplines including Preliminary Assessments, Remedial Investigations, and Feasibility Studies at Superfund sites, RCRA Facility Assessments, Initial Assessment Studies under the Naval Environmental Energy Study Assessment (NEESA), Region IV Compliance investigation for subsequent legal actions, Information Specialist for the EPA/Superfund Hotline, and assisting in the management of REM/FIT zone contracts.

Performed as task leader for the Blue Plains WWTP Biomonitoring Project consisting of laboratory setup, monitoring test organisms, conducting toxicity tests, and preparation of weekly and monthly reports.

EMPLOYMENT

<u>Dynamac Corporation (1988-present)</u>: Environmental Scientist

In working for Dynamac's Hazardous Materials Technical Center (HMTC), performs Preliminary Assessments, Remedial Investigations, and Feasibility Studies (PA/RI/FS) under the Air National Guard Installation Restoration Program. Specifically involved in preparing reports detailing site investigation findings, determining rates and extent of contamination, and recommendations for Phase II monitoring and soil sampling.

Participated in a remedial investigation/feasibility study at a Superfund site in Puerto Rico to ascertain the alleged extent of mercury contamination.

<u>C.C. Johnson & Malhotra, P.C. (1985-1988)</u>: Environmental Technician

Task leader for the Blue Plains WWTP Biomonitoring Project consisting of laboratory setup, monitoring test organisms, conducting toxicity tests, and preparation of weekly and monthly reports. Participated in groundwater monitoring, well installation and development at Independent Nail, SC, Superfund site. Conducted RCRA Facility Assessments (RFAs) under EPA's REM III Project for Regions I and IV. Performed literature search, site investigations, sample collection, CLP coordination, health and safety plan

preparation, data analysis, and document preparation. Participated on a team involved in the research and organization of compliance documents for subsequent legal actions. Participated in the preparation of an RI/FS consisting of surveying and soil, sediment, surface water and groundwater sampling, groundwater contamination migration determination, and residential well sampling at Geiger C&M Oil, SC, DeRewal, NJ, and Limestone Road, MD, Superfund sites. Assisted in the final preparation of the Initial Assessment Studies under the Navy's hazardous waste control program (NEESA) at three Navy facilities.

Geo/Resource Consultants (1984-1985): Environmental Assistant

Information Specialist for the EPA's RCRA/Superfund Hotline involved in technical assistance regarding federal and state regulations and the requirements necessary for the management of hazardous waste, for industry and the public.

Environmental Protection Agency (1981-1984): Intern

As an environmental intern, assisted Field Investigation Team (FIT) Deputy Project Officers in the management of REM/FIT zone contracts. Specifically involved in the evaluation of completed FIT projects, assistance in the award fee process, evaluation of FIT well drilling procedures, development of analytical documents for RCRA 3012 Cooperative Agreement Program, involving the development of a tracking system of the State agencies use of funds for hazardous waste cleanup.

BETSY A. BRIGGS

EDUCATION

B.S., Biology and Chemistry, State University College of New York at Cortland, 1979

Completed several courses in M.B.A. program, University of Phoenix, Denver, Colorado Division, 1984

SPECIALIZED TRAINING

Hazardous Waste Management course, Air Force Institute of Technology, 1986

CERTIFICATION

Certified Hazardous Materials Manager, Institute of Hazardous Materials Management, 1985

SECURITY CLEARANCE

Secret/DOE

EXPERIENCE

Nine years of experience including three years in hazardous waste management, two years as an environmental engineer, two years as an ecologist, and two years in laboratory research. Has conducted ambient air quality monitoring programs, critical pathways projects to study movement of radioactive materials in the environment, metallurgic laboratory analyses, and independent studies in biology and chemistry. Currently provides managerial oversight and technical support to a hazardous waste program for the Air Force.

EMPLOYMENT

Dynamac Corporation (1985-present): Program Manager/Hazardous Waste Specialist

Primary responsibility as program manager is to oversee and manage up to 44 field personnel involved in RCRA and CERCLA work in support of the U.S. Air Force. Other duties include performing preliminary assessments/site surveys for the Air National Guard, marketing and proposal preparation, and preparing and providing training in preparation for the Certified Hazardous Materials Manager examination.

As hazardous waste specialist the primary responsibility was to manage the hazardous waste program at Myrtle Beach Air Force Base. Duties included:

- o Reviewing the design and specifications of various base construction projects and overseeing such projects to ensure compliance with all applicable state and federal hazardous waste regulations. Projects under design included a corrosion control facility, TSD facility, two accumulation points, and a parts cleaning vat system. Construction project oversight included the final inspection of the entomology building to ensure that the facility was equipped for proper storage, usage and disposal of pesticides; removal of materials contaminated with pesticides, PCBs, petroleum products, and solvents from six sites; asbestos removal and disposal from a former hangar site; and the removal of two underground storage tanks, one of which was leaking.
- o Conducting surveys of hazardous waste generating activities.
- o Advising on need for and methods of minimizing hazardous waste generation.
- o Writing and maintaining hazardous waste management plan.
- o Preparing hazardous waste management reports and documents required by state and federal law.
- o Maintaining liaison with federal and state regulatory agencies on matters involving criteria, standards, performance specifications, and monitoring.
- o Providing information and technical consultation to Air Force installation staff regarding hazardous materials and hazardous waste operations.
- o Serving as ad hoc advisor to environmental contingency response teams.

<u>Rockwell International (1982-1984)</u>: Environmental Engineer

Primary responsibility was collection, evaluation, and reporting of ambient air monitoring data. Other responsibilities included technical assistance for monitoring total suspended solids in ambient air. Also performed data collection and reduction of air effluent emission control activities.

Environmental monitoring and control programs are to ensure that all Department of Energy and other governmental effluent regulations are met, and that plant effluents are consistent with the As Low As Reasonably Achievable (ALARA) Principle. Monthly and Annual Reports summarize the effluent and environmental monitoring programs.

<u>Rockwell International (1980-1982)</u>: Ecologist

Responsible for planning, organizing, and leading critical pathways projects designed to study the movement of radioactive materials throughout the environment. Projects were: (1) general critical pathway evaluation to identify

sampling points possibly not considered in present monitoring program; (2) plant uptake versus plant uptake plus foliar deposition measurement study; (3) deer tissue analysis program; and (4) food stuff monitoring program. Progress and results were published in semiannual reports.

Colorado School of Mines Research Institute, Texas Gulf Research Laboratory (1979-1980): Senior Laboratory Technician

Work involved quantitative analysis of platinum, palladium, and silver in soil samples. Analysis included sample preparation, fire assays, calorimetric procedures, and smelt tests.

State University College of New York at Cortland (1978-1979): Undergraduate Independent Study

Project involved the isolation of trail pheromone from spun silk of *Hyphantria* (fall webworm). Included organic and inorganic extraction procedures and performing bioassays. Also worked on production of synthetic diet comparable to fresh leaf diet for *Malacosomo* (eastern tent caterpillar).

PUBLICATIONS

Hazardous Waste Management Survey for Myrtle Beach Air Force Base, Hazardous Materials Technical Center, Rockville, Maryland, 1986 and 1988.

Hazardous Waste Management Plan for Myrtle Beach Air Force Base, Hazardous Materials Technical Center, Rockville, Maryland, 1987 and 1988.

Waste Minimization Guidance for Myrtle Beach Air Force Base, Hazardous Materials Technical Center, Rockville, Maryland, 1988.

Underground Storage Tank Management Plan for Myrtle Beach Air Force Base, Hazardous Materials Technical Center, Rockville, Maryland, 1988.

Annual Environmental Monitoring Report, Rockwell International, Energy Systems Group, Rocky Flats Plant, 1982 and 1983.

Environmental Studies Group Semiannual Report, Rockwell International, Energy Systems Group, Rocky Flats Plant, June/December of 1980 and 1981.

TECHNICAL PRESENTATIONS

PCB Management, Myrtle Beach Air Force Base, 1987.

Underground Storage Tank Regulations/History, Myrtle Beach Air Force Base, 1986.

Overview of the Hazardous Waste Training Program, Myrtle Beach Air Force Base, 1985.

Overview of the Environmental Studies Group, Nevada Test Site and Rockwell International at Hanford, Washington, 1981.

DAVID R. HALE

EDUC '.TION

B.S., Civil Engineering, Virginia Polytechnic Institute, 1978

SPECIALIZED TRAINING

Groundwater Remediation Course, National Water Well Association, 1986
Contract Supervisor School, CBI Industries, 1981

CERTIFICATION

Engineer-in-Training Certificate, State of Virginia, 1978

EXPERIENCE

Ten years' experience in a wide variety of engineering planning, design and management, environmental assessment and remediation, project and construction management, as well as research and development activities related to new and innovative technologies. Experience includes involvement in small-, medium- and large-scale environmental and civil projects, and includes project conception, design, implementation, construction and management activities. Extensive experience in the development, design and management of projects involving several interdisciplinary fields of engineering, sciences, and business. Proficiency in a wide variety of computer systems and usage, including mainframe and microcomputers as well as CAD systems.

EMPLOYMENT

Dynamac Corporation (1987-present): Manager of Engineering

Responsible for the engineering management of various environmental consulting engineering and technical services in the Dayton regional office. Responsibilities include the planning, development, and execution of engineering and technical services for environmental projects such as hazardous waste site investigations and remediation, asbestos assessment and abatement, RCRA permitting, monitoring and compliance, industrial hygiene and training, as well as other environmental matters.

DETOX, Inc. (1986): Manager, Technical Services

Responsible for the overall development, design, project management and implementation of various groundwater remediation projects, as well as several specialized wastewater treatment systems. Heavy emphasis on the conceptual development and design engineering related to innovative biological treatment techniques, equipment and systems, as well as multiunit process water and

wastewater treatment sy cems. Staff management responsibilities included supervision of engineering, procurement, and large-scale project management functions, as well as direct involvement in project marketing, corporate computer and CAD operations, and company R&D efforts.

DETOX, Inc. (1985-1986): Eastern Regional Manager

As regional manager for the eastern United States, responsibilities included the overall marketing, sales, and project management for groundwater remediation and industrial wastewater projects in this area. Efforts resulted in establishing a widespread customer interest base for the groundwater treatment equipment and technical services offered by DETOX, as well as sale and management of several substantial and innovative remediation projects. Instituted corporatewide microcomputer-based CAD and project management systems.

CBI Industries, Inc. (1981-1985): Project Engineer

As part of a new Water Technology Development venture group (1984-1985), involved in actively researching, seeking, and implementing for CBI new and innovative technologies and business lines. Responsibilities included acquisition research, engineering and financial analysis and assessment, market research, and business development. Two new business line developments resulted in $15 million to $20 million in annual revenues. Actively pursued several new business areas for CBI, including the privitization of municipal water and wastewater facilities, and sewage sludge composting. Initiated CBI interest in co-development of a new, innovative flue gas treatment technology for reducing acid-rain-causing emissions from fossil fuel combustion processes. Awarded one patent, with two pending applications, as a result of activities in the Water Technology group.

Project engineer assigned to various CBI Industries engineering departments (Special Structures, Standard Structures, and Marine Structures) (1981-1984); involved in the design and analysis of several substantial projects. These included the conception and design of two new and innovative offshore oil exploration drilling structures for use in Alaskan Arctic waters, with a patent award for one concept. Responsible for the external structural analysis and design on CBI's largest ever project, a turnkey LGN/LPG facility in excess of $350 million.

CBI Industries, Inc. (1979-1981): Project Engineer/Field Engineer

Assigned to CBI's Saudi Arabian construction subsidiary (Arabian CBI); worked as project and field engineer on several substantial field construction projects, including two refinery tankage terminals (a total of 120 petroleum tanks) and several refinery vessels and miscellaneous structures. Involved in the day-to-day management of large-scale field construction projects, including the close supervision and management of large numbers of field employees from several diverse nationalities. Responsible for the field engineering aspects of large petrochemical projects, including field layout, surveying, and erection supervision.

CBI Industries, Inc. (1978-1979): Engineer Traine

Worked at CBI's Delaware Engineering Office and Pennsylvania Manufacturing Plant as part of CBI's Engineer Advancement Program. Duties included familiarization with CBI procedures related to detail engineering and manufacturing, as well as hands-on training in such areas as welding, fabrication, and engineering drawing.

PUBLICATIONS

Hale, D.R., and E.K. Nyer. 1986. Two Years of Operation of a Groundwater Treatment System, Proceedings of the 1986 ASCE National Conference on Environmental Engineering.

Hale, D.R., et al. Physical/chemical in-situ treatment techniques. Chapter 10 in: In-situ Treatment Technology (in press).

TECHNICAL PRESENTATIONS

Instructor on Groundwater Treatment Technology, 1986 Aquifer Remediation Course Series presented by the National Water Well Association

Instructor on Groundwater Treatment Technology, 1986 HazPro Professional Certification Symposium

KATHRYN A. GLADDEN

EDUCATION

B.S., chemical engineering (minor in biological sciences), University of Washington, 1978

SECURITY CLEARANCE

Secret DOD clearance

EXPERIENCE

Seven years of experience in hazardous waste consulting and plant process engineering. Experience includes development of engineering alternatives for reduction of in-plant effluents and preparation of RCRA background listing documents for the plastics industry.

EMPLOYMENT

Dynamac Corporation (1985-present): Staff Engineer

Performs studies on the feasibility of solvent recycling, including the evaluation of several alternatives. Studies to date have included 15 sites. For each site, prepared reports describing present practice for solvent use and disposal, and conducted economic analyses of options.

Conducted preliminary site investigations and ranking of hazardous waste sites for the U.S. Federal Bureau of Prisons. Prepared reports detailing site investigation findings and recommendations for Phase II monitoring and sampling.

Preparing statement of work for a Phase IV-A remedial action plan for the Air Force's Installation Restoration Program.

Conducted analysis of public comments on Advanced Notice of Public Rulemaking to establish National Primary Drinking Water Regulations for radionuclide contaminants.

Peer Consultants (1984-1985): Staff Engineer

Developed background documents for listing of RCRA hazardous wastes.

Engineering Science (1983-1984): Staff Engineer

Conducted regulatory policy review and technology assessment of transportation and decontamination procedures for acutely hazardous wastes. Project engineer for development of a cost analysis methodology for the U.S. Army Toxic and Hazardous Materials Agency Installation Restoration Program.

Weyerhaeuser Company (1978-1983): Chemical Engineer

Conducted plant environmental audits to develop in-plant effluent load balances; developed capital alternatives and improved operating procedures for in-plant effluent reduction; developed and implemented recommendations for plant energy conservation and process optimization programs; investigated industrial hygiene impacts of wood pyrolysis air emissions, and performed pilot trials for wood gasification and pyrolysis technology development.

PROFESSIONAL AFFILIATIONS

Tau Beta Pi Engineering Honorary
Society of Women Engineers

RAYMOND G. CLARK, JR.

EDUCATION

Completed graduate engineering courses, George Washington University, 1957
B.S., Mechanical Engineering, University of Maryland, 1949

SPECIALIZED TRAINING

Grad. European Command Military Assistance School, Stuttgart, 1969
Grad. Army Psychological Warfare School, Fort Bragg, 1963
Grad. Sanz School of Languages, D.C., 1963
Grad. DOD Military Assistance Institute, Arlington, 1963
Grad. Defense Procurement Management Course, Fort Lee, 1960
Grad. Engineer Officer's Advanced Course, Fort Belvoir, 1958

CERTIFICATIONS

Registered Professional Engineer: Kentucky (#4341); Virginia (#8303); Florida (#36228)

EXPERIENCE

Thirty-one years of experience in engineering design, planning and management including construction and construction management, environmental, operations and maintenance, repair and utilities, research and development, electrical, mechanical, master planning and city management. Over six years' logistical experience including planning and programming of military assistance materiel and training for foreign countries, serving as liaison with American private industry, and directing materiel storage activities in an overseas area. Over two years' experience as an engineering instructor. Extensive experience in personnel management, cost reduction programs, and systems improvement.

EMPLOYMENT

Dynamac Corporation (1986-present): Program Manager/Department Manager

Responsible for activities relating to Preliminary Analysis, Site Investigations, Remedial Investigations, Feasibility Studies, and Remedial Action for the Installation Restoration Program for the U.S. Air Force, Air National Guard, Bureau of Prisons, and the U.S. Coast Guard, including records search, review and evaluation of previous studies; preparation of statements of work, feasibility studies; preparation of remedial action plans, designs and specifications; review of said studies/plans to ensure that they are in conformance with requirements; review of environmental studies and reports; preparation of Air Force Installation Restoration Program Management Guidance; and preparation of Part B permits.

Howard Needles Tammen & Bergendoff (HNTB) (1981-1986): Manager

Responsible, as Project Manager, for: design of a new concourse complex at Miami International Airport to include terminal building, roadway system, aircraft apron, drainage channel relocation, satellite building with underground pedestrian tunnel, and associated underground utility corridors, to include subsurface aircraft fueling systems, with an estimated construction cost of $163 million; a cargo vehicle tunnel under the crosswind runway with an estimated construction cost of $15 million; design and construction of two large corporate jet aircraft hangars; and for the hydrocarbon recovery program to include investigation, analysis, design of recovery systems, monitoring of recovery systems, and planning and design of residual recovery systems utilizing biodegradation. Participated, as sub-consultant, in Air Force IRP seminar.

HNTB (1979-1981): Airport Engineer

Responsibilities included development of master plan for Iowa Air National Guard base; project initiation assistance for a new regional airport in Florida; engineering assistance for new facilities design and construction for Maryland Air National Guard; master plan for city maintenance facilities, Orlando, Florida; in-country master plan and preliminary engineering project management for Madrid, Spain, International Airport; and project management of master plan for Whiting Naval Air Station and outlying fields in Florida.

HNTB (1974-1979): Design Engineer

Responsibilities included development of feasibility and site selection studies for reliever airports in Cleveland and Atlanta; site selection and facilities requirements for the Office of Aeronautical Charting and Cartography, NOAA; and onsite mechanical and electrical engineering design for terminal improvements at Baltimore-Washington International Airport, Maryland.

HNTB (1972-1974): Airport Engineer

Responsible for development of portions of the master plan and preliminary engineering for a new international airport for Lisbon, Portugal, estimated to cost $250 million.

Self-employed (1971-1972): Private Consultant

Responsible for engineering planning and installation of a production line for multimillion-dollar contract in Madrid, Spain, to fabricate transmissions and differentials for U.S. Army vehicles.

U.S. Army, Corps of Engineers (1969-1971): Chief, Materiel & Programs

Directed materiel planning and military training programs of military assistance to the Spanish Army. Controlled arrival and acceptance of materiel by host government. Served as liaison/advisor to American industry interested

in conducting business with Spanish government. Was Engineer Advisor to Spanish Army Construction, Armament and Combat Engineers, also the Engineer Academy and Engineer School of Application.

Corps of Engineers (1968-1969): Chief, R&D Branch, OCE

Directed office responsible to Chief of Engineers for research and development. Developed research studies in new concepts of bridging, new explosives, family of construction equipment, night vision equipment, expedient airfield surfacing, expedient aircraft fueling systems, water purification equipment and policies, prefabricated buildings, etc. Achieved Department of Army acceptance for development and testing of new floating bridge. Participated in high-level Department Committee charged with development of a Tactical Gap Crossing Capability Model.

Corps of Engineers (1967-1968): Division Engineer

Facilities engineer in Korea. Was fully responsible for management and maintenance of 96 compounds within 245 square miles including 6,000+ buildings, 1 million linear feet of electrical distribution lines, 18 water purification and distribution systems, sanitary sewage disposal systems, roads, bridges, and fire protection facilities with real property value of more than $256 million. Planned and developed the first five-year master plan for this area. Administered $12 million budget and $2 million engineer supply operation. Was in responsible charge of over 500 persons. Developed and obtained approval for additional projects worth $9 million for essential maintenance and repair. Directed cost reduction programs that produced more than $500,000 savings to the United States in the first year.

Corps of Engineers (1963-1967): Engineer Advisor

Engineer and aviation advisor to the Spanish Army. Developed major modernization program for Spanish Army Engineers, including programming of modern engineer and mobile maintenance equipment. Directed U.S. portion of construction, testing and acceptance of six powder plants, one shell loading facility, an Engineer School of Application, and depot rebuild facilities for engineer, artillery, and armor equipment. Planned and developed organization of a helicopter battalion for the Spanish Army. Responsible for sales, delivery, assembly and testing of 12 new helicopters in country. Provided U.S. assistance to unit until self-sufficiency was achieved. Was U.S. advisor to Engineer Academy, School of Application and Polytechnic Institute.

Corps of Engineers (1960-1963): Deputy District Engineer

Responsible for planning and development of extensive construction projects in the Ohio River Basin for flood control and canalization, including dam, lock, bridge, and building construction, highway relocation, watershed studies, real estate acquisitions and dispositions. Was contracting officer for more than $75

million of projects per year. Supervised approximately 1,300 personnel, including 300 engineers. Planned and directed cost reduction programs amounting to more than $200,000 per year. Programmed and controlled development of a modern radio and control net in a four-state area.

Corps of Engineers (1959-1960): Area Engineer

Directed construction of a large airfield in Ohio as Contracting Officer's representative. Assured that all construction (runway, steam power plant, fuel transfer and loading facilities, utilities, buildings, etc.) complied with terms of plans and specifications. Was onsite liaison between Air Force and contractors.

Corps of Engineers (1958-1959): Chief, Supply Branch

Managed engineer supply yard containing over $21 million construction supplies and engineer equipment. Directed in-storage maintenance, processing and deprocessing of equipment. Achieved complete survey of items on hand, a new locator system and complete rewarehousing, resulting in approximately $159,000 savings in the first year.

Corps of Engineers (1957-1958): Student

U.S. Army Engineer School, Engineer Officer's Advanced Course.

Corps of Engineers (1954-1957): Engineer Manager

Managed engineer construction projects and was assigned to staff and faculty of the Engineer School. Was in charge of instruction on engineer equipment utilization, management and maintenance. Directed Electronic Section of the school. Coordinated preparation of five-year master plan for the Department of Mechanical and Technical Equipment.

Corps of Engineers (1949-1954): Engineer Commander

Positions of minor but increasing importance and responsibility in engineering management, communications, demolitions, construction administration and logistics.

PROFESSIONAL AFFILIATIONS

Member, National Society of Professional Engineers
Fellow, Society of American Military Engineers
Member, American Society of Civil Engineers
Member, Virginia Engineering Society
Member, Project Management Institute

HARDWARE

IBM PC

SOFTWARE

Lotus 1-2-3, D Base III Plus, Framework, Project Scheduler 5000, Harvard Project Manager, Volkswriter, Microsoft Project

MARK D. JOHNSON

EDUCATION

B.S., Geology, James Madison University, 1980

EXPERIENCE

Eight years' technical and management experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance, preparation of statements of work for environmental field monitoring and feasibility studies for the Air Force and the Air National Guard, development of environmental field monitoring programs, and preparation of Preliminary Assessments for the Air National Guard.

EMPLOYMENT

Dynamac Corporation (1984-present): Senior Staff Scientist/Geologist

Primarily responsible for developing and managing technical support programs relevant to CERCLA related activities for the Air Force, Air National Guard, Department of Justice and Coast Guard. These activities include Statements of Work for Site Investigations (SI), Remedial Investigations (RI), and Feasibility Studies (FS); assessing groundwater at hazardous waste disposal/spill sites for the purpose of determining rates and extents of contaminant migration and for developing SI and RI programs and identifying remedial actions; reviewing SI, RI and FS contractor work plans for various government clients, developing technical and contractual requirements for SI, RI and FS projects, managing the development and preparation of Preliminary Assessments, and assisting clients in the development of their environmental management programs, which included preparation of the Air Force's Installation Restoration Program Management Guidance document.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

PROFESSIONAL CREDENTIALS

Registered Professional Geologist, South Carolina, #116, 1987

PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
National Water Well Association/Association of Ground Water Scientists and Engineers

Appendix B

Outside Agency

Contact List

OUTSIDE AGENCY CONTACT LIST

1. National Oceanic and Atmospheric Administration
   6001 Executive Boulevard
   Rockville, Maryland 20853

2. Ohio Department of Natural Resources
   Division of Water
   Fountain Square, Building E-3
   Columbus, Ohio 43224
   (614) 265-6717

3. Ohio Department of Natural Resources
   Division of Wildlife
   Fountain Square, Building C-4
   Columbus, Ohio 43224
   (614) 265-6305

4. Ohio Geological Survey
   Fountain Square, Building B
   Columbus, Ohio 43224
   (614) 265-6605

5. U.S. Geological Survey
   12201 Sunrise Valley Drive
   Reston, Virginia 22092
   (703) 648-4000

6. University of Dayton
   Department of Geology
   300 College Park Avenue
   Dayton, Ohio 45469
   (513) 229-2921

Appendix C

USAF Hazard Assessment Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has developed a comprehensive program to identify, evaluate, and control hazardous waste disposal practices associated with past waste disposal techniques at DoD facilities. One of the actions required under this program is to:

> Develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, December 11, 1981).

Accordingly, the U.S. Air Force has sought to establish a system to set priorities for taking further action at sites based upon information gathered during the Preliminary Assessment phase of the Installation Restoration Program.

PURPOSE

The purpose of the site rating model is to assign a ranking to each site where there is suspected contamination from hazardous substances. This model will assist the National Guard in setting priorities for follow-up site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous waste present in sufficient quantity), and (2) potential for migration exists. A site may be deleted from ranking consideration on either basis.

DESCRIPTION OF THE MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score

based on the most likely routes of contamination and worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors presented in this appendix. The site rating form and the rating factor guidelines are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: (1) possible receptors of the contamination, (2) the waste and its characteristics, (3) the potential pathways for contaminant migration, and (4) any effort that was made to contain the waste resulting from a spill.

The receptors category rating is based on four rating factors: (1) the potential for human exposure to the site, (2) the potential for human ingestion of contaminants should underlying aquifers be polluted, (3) the current and anticipated use of the surrounding area, and (4) the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1000 feet of the site and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore is computed as follows: receptors subscore = (100 X factor subtotal/maximum score subtotal).

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence

in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score while scores for solids are reduced.

The pathways category rating is based on evidence of contaminant migration along one of three pathways: surface water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated, and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. The waste management practice category is then scored. Scores for sites with no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well-managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the score for the other three categories.

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE ____________________

LOCATION ____________________

DATE OF OPERATION OR OCCURRENCE ____________________

OWNER/OPERATOR ____________________

COMMENTS/DESCRIPTION ____________________

SITE RATED BY ____________________

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site		4		12
B. Distance to nearest well		10		30
C. Land use-zoning within 1 mile radius		3		9
D. Distance to installation boundary		6		18
E. Critical environments within 1 mile radius of site		10		30
F. Water quality of nearest surface water body		6		18
G. Groundwater use of uppermost aquifer		9		27
H. Population served by surface water supply within 3 miles downstream of site		6		18
I. Population served by groundwater supply within 3 miles of site		6		18
		Subtotals	______	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) ______

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ______
2. Confidence level (C = confirmed, S = suspected) ______
3. Hazard rating (H = high, M = medium, L = low) ______

Factor Subscore A (from 20 to 100 based on factor score matrix) ______

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

______ x ______ = ______

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

______ x ______ = ______

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		24
		Subtotals		108

Subscore (100 x factor score subtotal/maximum score subtotal) ______

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24
		Subtotals		114

Subscore (100 x factor score subtotal/maximum score subtotal) ______

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

______ x ______ = ______

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

	Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A.	Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B.	Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C.	Land use/zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D.	Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E.	Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F.	Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G.	Groundwater use of uppermost aquifer	Not used, other sources readily available	Commercial Industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available, commercial, industrial, or irrigation; no other water source available	9
H.	Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I.	Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability, and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
	L	C	H
80	M	C	H
70	L	S	H
	S	C	H
60	M	C	H
	L	S	H
	L	C	L
50	M	S	H
	S	C	M
	S	S	H
	M	S	M
40	M	C	L
	L	S	L
	S	C	L
30	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level
- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating
- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCH + SCH = LCH if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCH designation (60 points). By adding the quantities of each waste, the designation may change to LCH (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical state	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, groundwater, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reporte[d] discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to a mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year, 24 hour rainfall (thunderstorms)	<1.0 inch 0-5 0	1.0 to 2.0 inches 6-35 30	2.1 to 3.0 inches 36-49 60	>3.0 inches >50 100	8

B-2 Potential for Flooding

Rating Factors	0	1	2	3	Multiplier
Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Groundwater Contamination

Rating Factors	0	1	2	3	Multiplier
Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay 10^{-2} to 10^{-4} cm/sec	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high groundwater level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean groundwater level	8
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-B-3, then leave blank for calculation of factor score and maximum possible score.

Appendix D

Site Hazardous Assessment Rating Forms and Factor Rating Criteria

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE FTA No. 1 (Site 1)

LOCATION Ohio Air National Guard, Swanton, Ohio

DATE OF OPERATION OR OCCURRENCE 1956 to 1966

OWNER/OPERATOR 180th TFG

COMMENTS/DESCRIPTION

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
100 x 1.0 = 100

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
100 x 1.0 = 100

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to groundwater	0	8	0	24
Subtotals			62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	100
Pathways	80

Total 239 divided by 3 = 80
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

80 x 1.0 = $\boxed{80}$

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE FTA No. 2 (Site 2)

LOCATION Ohio Air National Guard, Swanton, Ohio

DATE OF OPERATION OR OCCURRENCE 1966 to 1978

OWNER/OPERATOR 180th TFG

COMMENTS/DESCRIPTION

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
100 x 1.0 = 100

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
100 x 1.0 = 100

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore **80**

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	68	108

Subscore (100 x factor score subtotal/maximum score subtotal) **63**

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) **0**

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to groundwater	0	8	0	24
		Subtotals	62	114

Subscore (100 x factor score subtotal/maximum score subtotal) **54**

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore **80**

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	100
Pathways	80

Total 239 divided by 3 = 80
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

80 x 1.0 = **80**

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE FTA No. 3 (Site 3)

LOCATION Ohio Air National Guard, Swanton, Ohio

DATE OF OPERATION OR OCCURRENCE early 1970's

OWNER/OPERATOR 180th TFG

COMMENTS/DESCRIPTION

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
60 x 1.0 = 60

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to groundwater	0	8	0	24
		Subtotals	62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	60
Pathways	80

Total 199 divided by 3 = 66
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

66 x 1.0 = 66

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE FTA No. 4 (Site 4)

LOCATION Ohio Air National Guard, Swanton, Ohio

DATE OF OPERATION OR OCCURRENCE early 1970's

OWNER/OPERATOR 180th TFG

COMMENTS/DESCRIPTION

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
60 x 1.0 = 60

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to groundwater	0	8	0	24
Subtotals			62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	60
Pathways	80

Total 199 divided by 3 = 66
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

66 x 1.0 = 66

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE POL Storage Area (Site 5)

LOCATION Ohio Air National Guard, Swanton, Ohio

DATE OF OPERATION OR OCCURRENCE 1956 - Present

OWNER/OPERATOR 180th TFG

COMMENTS/DESCRIPTION

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
60 x 1.0 = 60

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to groundwater	0	8	0	24
		Subtotals	62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	60
Pathways	80

Total 199 divided by 3 = 66
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

66 x 1.0 = 66

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Western Drainage Area (Site 6)

LOCATION Ohio Air National Guard, Swanton, Ohio

DATE OF OPERATION OR OCCURRENCE 1956 - Present

OWNER/OPERATOR 180th TFG

COMMENTS/DESCRIPTION

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
60 x 1.0 = 60

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to groundwater	0	8	0	24
		Subtotals	62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	60
Pathways	80

Total 199 divided by 3 = 66
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

66 x 1.0 = $\boxed{66}$

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Eastern Drainage Area (Site 7)

LOCATION Ohio Air National Guard, Swanton, Ohio

DATE OF OPERATION OR OCCURRENCE 1956 - Present

OWNER/OPERATOR 180th TFG

COMMENTS/DESCRIPTION

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
60 x 1.0 = 60

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to groundwater	0	8	0	24
		Subtotals	62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	60
Pathways	80

Total 199 divided by 3 = 66
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

66 x 1.0 = 66

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE FTA No. 5 (Site 8)

LOCATION Ohio Air National Guard, Swanton, Ohio

DATE OF OPERATION OR OCCURRENCE 1956 - Present

OWNER/OPERATOR 180th TFG

COMMENTS/DESCRIPTION

SITE RATED BY HMTC

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
60 x 1.0 = 60

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to groundwater	0	8	0	24
		Subtotals	62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	60
Pathways	80

Total 199 divided by 3 = 66 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

66 x 1.0 = $\boxed{66}$

180th Fighter Group
Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

1. RECEPTORS CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
Population within 1,000 feet of site:		
Site No. 1	26 to 100	2
Site No. 2	26 to 100	2
Site No. 3	26 to 100	2
Site No. 4	26 to 100	2
Site No. 5	26 to 100	2
Site No. 6	26 to 100	2
Site No. 7	26 to 100	2
Site No. 8	26 to 100	2
Distance to nearest well:		
Site No. 1	Below 3,000 feet	3
Site No. 2	Below 3,000 feet	3
Site No. 3	Below 3,000 feet	3
Site No. 4	Below 3,000 feet	3
Site No. 5	Below 3,000 feet	3
Site No. 6	Below 3,000 feet	3
Site No. 7	Below 3,000 feet	3
Site No. 8	Below 3,000 feet	3
Land use/zoning within 1 mile radius:	Commercial or industrial	2
Distance Base boundary:		
Site No. 1	Below 1,000 feet	3
Site No. 2	Below 1,000 feet	3
Site No. 3	Below 1,000 feet	3
Site No. 4	Below 1,000 feet	3
Site No. 5	Below 1,000 feet	3
Site No. 6	Below 1,000 feet	3
Site No. 7	Below 1,000 feet	3
Site No. 8	Below 1,000 feet	3
Critical environments within 1 mile:	Not a critical environment	0
Water quality of nearest surface water body	Recreation, propagation and management of fish and wildlife	1
Groundwater use of uppermost aquifer:	Drinking water, no municipal water available	3
Population served by surface water supply within 3 miles downstream of site:	0	0
Population served by ground-water supply within 3 miles of site:	51 to 1000	2

180th Fighter Group
Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

2. WASTE CHARACTERISTICS CATEGORY

Quantity:

Site No. 1	Large quantity	L
Site No. 2	Large quantity	L
Site No. 3	Small quantity	S
Site No. 4	Small quantity	S
Site No. 5	Small quantity	S
Site No. 6	Small quantity	S
Site No. 7	Small quantity	S
Site No. 8	Small quantity	S

Confidence Level:

Site No. 1	Confirmed	C
Site No. 2	Confirmed	C
Site No. 3	Confirmed	C
Site No. 4	Confirmed	C
Site No. 5	Confirmed	C
Site No. 6	Confirmed	C
Site No. 7	Confirmed	C
Site No. 8	Confirmed	C

Hazard Rating:

Toxicity

Site No. 1	Sax Level 3	3
Site No. 2	Sax Level 3	3
Site No. 3	Sax Level 3	3
Site No. 4	Sax Level 3	3
Site No. 5	Sax level 3	3
Site No. 6	Sax Level 3	3
Site No. 7	Sax Level 3	3
Site No. 8	Sax Level 3	3

Ignitability

Site No. 1	Flash point 80°F to 140°F	2
Site No. 2	Flash point 80°F to 140°F	2
Site No. 3	Flash point 80°F to 140°F	2
Site No. 4	Flash point 80°F to 140°F	2
Site No. 5	Flash point 80°F to 140°F	2
Site No. 6	Flash point 80°F to 140°F	2
Site No. 7	Flash point 80°F to 140°F	2
Site No. 8	Flash point 80°F to 140°F	2

Radioactivity

Site No. 1	At or below background levels	0
Site No. 2	At or below background levels	0
Site No. 3	At or below background levels	0
Site No. 4	At or below background levels	0
Site No. 5	At or below background levels	0
Site No. 6	At or below background levels	0
Site No. 7	At or below background levels	0
Site No. 8	At or below background levels	0

180th Fighter Group
Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

Persistence Multiplier:

Site No. 1	Metals, polycyclic compounds and halogenated compounds	1.0
Site No. 2	Metals, polycyclic compounds and halogenated compounds	1.0
Site No. 3	Metals, polycyclic compounds and halogenated compounds	1.0
Site No. 4	Metals, polycyclic compounds and halogenated compounds	1.0
Site No. 5	Metals, polycyclic compounds and halogenated compounds	1.0
Site No. 6	Metals, polycyclic compounds and halogenated compounds	1.0
Site No. 7	Metals, polycyclic compounds and halogenated compounds	1.0
Site No. 8	Metals, polycyclic compounds and halogenated compounds	1.0

Physical State Multiplier:

Site No. 1	Liquid	1.0
Site No. 2	Liquid	1.0
Site No. 3	Liquid	1.0
Site No. 4	Liquid	1.0
Site No. 5	Liquid	1.0
Site No. 6	Liquid	1.0
Site No. 7	Liquid	1.0
Site No. 8	Liquid	1.0

3. PATHWAYS CATEGORY

Surface Water Migration:

Distance to nearest surface water

Site No. 1	0 to 500 feet	3
Site No. 2	0 to 500 feet	3
Site No. 3	0 to 500 feet	3
Site No. 4	0 to 500 feet	3
Site No. 5	0 to 500 feet	3
Site No. 6	0 to 500 feet	3
Site No. 7	0 to 500 feet	3
Site No. 8	0 to 500 feet	3
Net precipitation	-10 to +5 inches	1
Surface erosion	Moderate	2
Surface Permeability	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	1
Rainfall intensity	2.5 inches	2
Flooding:	Beyond 100-year flood plain	0

180th Fighter Group
Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

Groundwater Migration:

Depth to groundwater	0 to 10 feet	3
Net precipitation	-10 to +5 inches	1
Soil permeability	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	2
Subsurface flow	Bottom of site frequently submerged	2
Direct access to groundwater	No evidence of risk	0

4. WASTE MANAGEMENT PRACTICES CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
Practice:		
Site No. 1	No containment	1.0
Site No. 2	No containment	1.0
Site No. 3	No containment	1.0
Site No. 4	No containment	1.0
Site No. 5	No containment	1.0
Site No. 6	No containment	1.0
Site No. 7	No containment	1.0
Site No. 8	No containment	1.0

Appendix E

Soil Borings

SECTION 02200-10

PROJECT OHIO AIR NATIONAL GUARD
FUEL CELL MAINTENANCE
CORROSION CONTROL FACILITY
TOLEDO EXPRESS AIRPORT
SWANTON, OHIO

TOLEDO TESTING LABORATORY, INC.
ENGINEERS – CHEMISTS – GEOLOGISTS
1810 NORTH 12TH STREET
TOLEDO, OHIO 43624

BORING LOCATION Approximately 135'S of existing edge of pavement and 155'E of existing Fire Station #102

LABORATORY NO. 400014

DATE March 9, 1976

SOIL BORING NO. 1

Sample & Type	Depth (Ft. — In.)	▽	SOIL DESCRIPTION	Blows Per 6"	Moisture Content (%)	Dry Unit Weight (P.C.F.)	Unconfined Compressive Strength (P.S.F.)	Allowable Bearing Strength (P.S.F.)
			Existing Ground Surface					
	0'6"		Topsoil					
	2'0"		Brown fine to coarse-grained sand, traces of silt and clay, medium to dense, wet					
	3'6"							
No.1				13				
H				18	20.5	-	-	7,200
	5'0"			18				
	8'6"							
No.2				10				Over
H				21	23.7	-	-	10,000
	10'0"			34				
			Grey fine to coarse-grained sand, traces of silt and clay, medium to very dense, wet					
	13'6"							
No.3				4				
H				9	25.1	-	-	5,400
	15'0"			18				
	17'0"							
			Grey clayey silt, trace to little sand, trace of gravel, dense, wet					
	18'6"							
No.4				9				
H				12	22.5	102.0	-	6,800
	20'0"			22				

TYPE OF SAMPLE
A Auger (Disturbed)
— Split Tube Sampling —
H Thin-walled (Housel) Tube-Undisturbed
J Jar-Disturbed
ST Shelby Tube-Undisturbed
PC Rock Core
NR Indicates "No Recovery"

REMARKS: Total Footage: 20'0"
Overburden Drilled: ______ Rock Cored: ______

Drillers: TPW-JD-PM

GROUNDWATER OBSERVATIONS
Encountered at 3'0" during boring operations

At completion: 2'0" below the ground surface

* Number of Blows (Standard Penetration Test) -- Numbers in parentheses not ... Bearing Strength Determinations

PROJECT OHIO AIR NATIONAL GUARD
FUEL CELL MAINTENANCE
CORROSION CONTROL FACILITY
TOLEDO EXPRESS AIRPORT
SWANTON, OHIO

BORING LOCATION Approximately 125'S of existing edge of pavement and 245'E of Fire Station #102

TOLEDO TESTING LABORATORY, INC

REGISTERED
ENGINEERS – CHEMISTS – GEOLOGISTS
1810 NORTH 12TH STREET
TOLEDO, OHIO 43624

LABORATORY NO. 400014

DATE March 9, 1976

SOIL BORING NO. 2

Sample & Type	Depth (Ft. – In.)	▽	SOIL DESCRIPTION	Blows Per 6"	Moisture Content (%)	Dry Unit Weight (P.C.F.)	Unconfined Compressive Strength (P.S.F.)	Allowable Bearing Strength (P.S.F.)
			Existing Ground Surface					
	0'6"		Topsoil					
			Brown fine to coarse-grained sand, traces of silt and clay, medium, wet					
	2'0"							
	3'6"							
No.1				11				
H				15	19.7	-	-	6,800
	5'0"			19				
	8'6"		Grey fine to coarse-grained sand, traces of silt and clay, dense, moist to wet					
No.2				24				
H				22	22.0	-	-	9,000
	10'0"			23				
	13'6"							
No.3				12				
H				10	16.3	-	-	6,000
	15'0"			20				
	18'6"		Grey clayey silt, traces of sand and gravel, dense, wet					
No.4				12				
H				14	23.7	99.0	-	7,600
	20'0"			24				

TYPE OF SAMPLE
A Auger (Disturbed)
— Split Tube Sampling —
H Thin-walled (Housel) Tube Undisturbed
J Jar-Disturbed
ST Shelby Tube-Undisturbed
RC Rock Core
NR Indicates "No Recovery"

REMARKS: Total Footage: 20'0"
Overburden Drilled: Rock Cored:

Drillers: TPW-JD-PM

E-2

GROUNDWATER OBSERVATIONS

Encountered at 3'0" during boring operations

At completion: 1'0" below the ground surface

Number of Blows (Standard Penetration Test) – Numbers in parenthesis ... Bearing Strength Determinations

PROJECT OHIO AIR NATIONAL GUARD
FUEL CELL MAINTENANCE
CORROSION CONTROL FACILITY
TOLEDO EXPRESS AIRPORT
SWANTON, OHIO

TOLEDO TESTING LABORATORY, INC.
REGISTERED
ENGINEERS – CHEMISTS – GEOLOGISTS
1810 NORTH 12TH STREET
TOLEDO, OHIO 43624

BORING LOCATION Approximately 25'S of existing edge of pavement and 200'E of Fire Station #102

LABORATORY NO. 400014

DATE March 9, 1976

SOIL BORING NO. 3

Sample & Type	Depth (Ft. — In.)	▽	SOIL DESCRIPTION Existing Ground Surface	Blows Per 6"	Moisture Content (%)	Dry Unit Weight (P.C.F.)	Unconfined Compressive Strength (P.S.F.)	Allowable Bearing Strength (P.S.F.)
	0'6"		Topsoil					
No.1 A/J			Brown and grey fine to coarse-grained sand, traces of silt, clay and gravel					
	5'0"							

END OF SECTION

TYPE OF SAMPLE
A Auger (Disturbed)
— Split Tube Sampling —
H Thin-walled (Housel) Tube-Undisturbed
J Jar-Disturbed
ST Shelby Tube-Undisturbed
RC Rock Core
NR Indicates "No Recovery"

REMARKS: Total Footage: 5'0"
Overburden Drilled: ________ Rock Cored: ________

Drillers: JD-RH

GROUNDWATER OBSERVATIONS

No groundwater encountered during bori operations

At completion: 5'0" below the ground surface

Number of Blows (Standard Penetration Test) — Numbers in parenthe (for Bearing Strength Determinations

PROJECT Camp Perry

JOB NO. 102-25002

LOCATION Port Clinton, Ohio

SURFACE ELEV. 575.0

DATE 4-26-82

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
1SS	1		Medium stiff moist brown silty CLAY, some Sand (CL)	3, 4, 4	26				
2SS	2–3		Stiff moist brown gray silty CLAY, some Sand (CL)	3, 4, 5	25				
3SS	4		Stiff moist brown silty CLAY, some Sand (CL)	3, 4	24				
				5	17	140.8	119.9	6720	11.8
4SS	5–6		Very stiff moist brown silty CLAY, some Sand, trace Gravel (CL)	8, 10, 13	16				
5SS	7–8		Hard moist brown silty CLAY, some Sand (CL)	10, 15, 22	15				
6SS	8–9		Hard moist brown gray silty CLAY, some Sand, trace Gravel (CL)	12, 17, 20	16				
7SS	10		Very stiff moist gray silty CLAY, some Sand, trace Gravel (CL)	7, 10, 11	13				
	11								
8SS	12–13		Very stiff moist gray silty CLAY, some Sand (CL)	6, 6, 9	16				
	14								
9SS	15		Very stiff moist gray silty CLAY, some Sand, trace Gravel (CL)	5, 9, 11	12				
	16								
	17								
	18								
	19								
10SS	20		Hard moist gray SILT, some Sand, little Gravel (ML) BORING TERMINATED @ (-)20'.	19, 27, 26	9				
	21								
	22								
	23								
	24								
	25								

TYPE OF SAMPLE
D DISTURBED
U L UNDIST. LINER
S T SHELBY TUBE
S S SPLIT SPOON
R C ROCK CORE
PENETROMETER

REMARKS: Shelby tube was pushed on a 4' west offset at four feet.

E-4

...netration Test — Driving 2" OD Sam... ...mer Falling ...

GROUND WATER OBSERVATIONS
G W ENCOUNTERED AT FT INS
G W ENCOUNTERED AT FT INS
G W AFTER COMPLETION DRY FT INS
G W AFTER 24 HRS 4 FT 0 INS

JOB NO. 102-25002 LOCATION Port Clinton, Ohio

SURFACE ELEV. 574.7 DATE 4-27-82

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
1SS	1		Medium stiff moist gray silty CLAY, some Sand, trace Gravel (CL)	2 3 5	20				
2SS	2 3		Medium stiff moist brown gray silty CLAY, some Sand (CL)	4 4 4	31				
3SS	4		Medium stiff wet brown silty CLAY, some Sand (CL)	3 2 4	32 30	127.3	97.9	2060	9.6
4SS	5 6		Medium stiff moist brown gray silty CLAY, some Sand (CL)	3 3 5	27				
5SS	7 8		Medium stiff moist brown silty CLAY, some Sand (CL)	4 3 6	25				
6SS	9		Stiff moist brown silty CLAY, some Sand (CL)	3 4 6	26				
7SS	10 11		Medium stiff moist gray silty CLAY, some Sand, trace of Gravel (CL)	2 2 4	17				
8SS	12		Stiff moist gray silty CLAY, some Sand, trace of Gravel (CL)	5 6 7	15				
	13 14								
9SS	15 16		Very stiff moist gray silty CLAY, some Sand, trace of Gravel	5 6 10	16				
	17 18 19								
10SS	20 21		Very stiff moist gray clayey SILT, some Sand (ML) BORING TERMINATED @ (-)20'.	7 12 13	24				
	22 23 24 25								

TYPE OF SAMPLE
D DISTURBED
UL UNDIST LINER
ST SHELBY TUBE
SS SPLIT SPOON
RC ROCK CORE
PENETROMETER

REMARKS: A Shelby tube was pushed on a 3' north offset at 4 feet.

E-5

and ... ration Test — Driving 2" OD ... With ... Failure ... Count Made ...

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT		FT	INS
G.W. ENCOUNTERED AT		FT	INS
G.W. AFTER COMPLETION	DRY	FT	INS
G.W. AFTER	DRY HRS	FT	INS

JOB NO. 102-25002 LOCATION Port Clinton, Ohio

SURFACE ELEV 575.0 DATE 4-27-82

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Str. %
1SS	1		1" of TOPSOIL followed by gray silty CLAY	2 1 3	30				
2SS	2 3		Medium stiff moist gray silty CLAY, some Sand (CL)	2 1 5	34				
3ST	4 5		Soft wet brown silty CLAY, some Sand (CL)		34	123.3	92.0	996	4.8
4SS	6		Medium stiff wet brown silty CLAY, some Sand (CL)	2 3 2	33				
5SS	7 8		Medium stiff wet brown silty CLAY, some Sand (CL)	2 3 5	27				
6SS	9 10		Stiff moist brown silty CLAY, some Sand (CL)	3 6 8	21				
7SS	11		Very stiff moist brown silty CLAY, some Sand (CL)	3 6 10	18				
8SS	12 13 14		Very stiff moist gray silty CLAY, some Sand, trace of Gravel (CL)	6 10 12	16				
9SS	15 16 17 18 19		Very stiff moist gray silty CLAY, some Sand, trace of Gravel (CL)	5 7 10	15				
10SS	20 21 22 23 24 25		Hard wet gray SILT, some Sand (ML) BORING TERMINATED @ (-)20'.	9 26 33	19				

TYPE OF SAMPLE
D DISTURBED
UL UNDIST. LINER
ST SHELBY TUBE
SS SPLIT SPOON
RC ROCK CORE
PENETROMETER

REMARKS:

Std Penetration Test — Driving 2 [illegible]

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT FT INS
G.W. ENCOUNTERED AT FT INS
G.W. AFTER COMPLETION 5 FT 0 INS
G.W. AFTER HRS DRY FT INS
G.W. VOLUMES

Appendix F

Underground Tanks

Underground Storage Tank Inventory
180th TFG, Ohio Air National Guard
Toledo Express Airport, Swanton, Ohio

Location	Bldg 133	Bldg 133	Bldg 133	Bldg 133	Bldg 133	Bldg 107	Bldg 107
Capacity (gallons)	550	550	4000	N/A	N/A	25000	25000
Contents	waste oil	waste oil	wastewater (storm)	oil/water	oil/water	JP-4	JP-4
Year Installed	1971	1979	1979	1971	1979	1958	1958
Material of Construction	steel	steel	steel	concrete	concrete	steel	steel
Coatings A. Interior B. Exterior	 unknown coated	 unknown coated	 unknown coated	 unknown unknown	 unknown unknown	 coated coated	 coated coated
Cathodic Protection	none	none	none	none	none	none	none
Status of Tank (year abandoned)	in use	in use	in use	in use	in use	in use	in use

NOTE: Coated tanks have an undercoating unless otherwise noted.

Underground Storage Tank Inventory
180th TFG, Ohio Air National Guard
Toledo Express Airport, Swanton, Ohio (continued)

Location	Bldg 107	Bldg 107	Bldg 313	Bldg 313	Bldg 124	Bldg 124	Bldg 124
Capacity (gallons)	25000	25000	500	1000	1000	300	N/A
Contents	JP-4	JP-4	waste oil	wastewater (sanitary)	fuel oil	waste oil	oil/water
Year Installed	1958	1958	1984	1984	1977	1977	1977
Material of Construction	steel	steel	concrete	concrete	steel	steel	concrete
Coatings A. Interior B. Exterior	 coated coated	 coated coated	 unknown unknown	 unknown unknown	 coated bitumen	 coated bitumen	 unknown unknown
Cathodic Protection	none	none	none	none	none	none	none
Status of Tank (year abandoned)	in use	in use	in use	in use	in use	in use	in use

NOTE: Coated tanks have an undercoating unless otherwise noted.

Underground Storage Tank Inventory
180th TFG, Ohio Air National Guard
Toledo Express Airport, Swanton, Ohio (continued)

Location	Bldg 124	Bldg 124	Bldg 112	Bldg 112	Bldg 101	Bldg 101	Bldg 101
Capacity (gallons)	1000	400	550	N/A	500	N/A	15000
Contents	settling tank wastewater	detergent	waste oil	oil/water	waste oil	oil/water	fuel oil
Year Installed	1977	1977	1971	1971	1970	1970	1957
Material of Construction	steel	steel	steel	concrete	steel	concrete	steel
Coatings A. Interior B. Exterior	unknown coated	epoxy paint	unknown unknown	unknown unknown	unknown coated	unknown unknown	unknown coated
Cathodic Protection	none	none	none	none	none	none	none
Status of Tank (year abandoned)	in use	in use	in use	in use	in use	in use	in use

NOTE: Coated tanks have an undercoating unless otherwise noted.

Underground Storage Tank Inventory
180th TFG, Ohio Air National Guard
Toledo Express Airport, Swanton, Ohio (continued)

Location	Bldg 119	Bldg 119	Bldg 119	Bldg 119	Bldg 119	Bldg 122
Capacity (gallons)	1000	550	4000	6000	6000	500
Contents	oil/water	waste oil	fuel oil	diesel	MOGAS	diesel
Year Installed	1976	1976	1976	1976	1976	1974
Material of Construction	concrete	steel	fiberglass	fiberglass	fiberglass	steel
Coatings A. Interior B. Exterior	 unknown unknown	 unknown coated	 unknown unknown	 unknown unknown	 unknown unknown	 unknown coated
Cathodic Protection	none	none	none	none	none	none
Status of Tank (year abandoned)	in use	in use	in use	in use	in use	in use

NOTE: Coated tanks have an undercoating unless otherwise noted.

Underground Storage Tank Inventory
180th TFG, Ohio Air National Guard
Toledo Express Airport, Swanton, Ohio (continued)

Location	Bldg 103	Bldg 103	Bldg 103	Bldg 127	Bldg 118	Bldg 121	Bldg 121
Capacity (gallons)	4000	N/A	300	2000	2000	N/A	550
Contents	MOGAS	oil/water	waste oil	fuel oil	fuel oil	oil/water	waste oil
Year Installed	1958	1968	1968	1979	1976	1973	1973
Material of Construction	steel	concrete	steel	fiberglass	fiberglass	concrete	steel
Coatings A. Interior B. Exterior	 unknown coated	 unknown unknown	 unknown coated	 unknown unknown	 unknown unknown	 unknown unknown	 unknown unknown
Cathodic Protection	none	none	none	none	none	none	none
Status of Tank (year abandoned)	in use	in use	in use	in use	in use	in use	in use

NOTE: Coated tanks have an undercoating unless otherwise noted.

Underground Storage Tank Inventory
200th RHCES, Ohio Air National Guard
Camp Perry ANG Station, Port Clinton, Ohio

Location	Bldg 2/4	Bldg 2/4	Bldg 2/4	Bldg 4	Bldg 4	Bldg 6	Bldg 14
Capacity (gallons)	2,000	10,000	4,000	8,000	500	8,000	1,250
Contents	Gasoline	Diesel Fuel	Gasoline	Heating Oil	Waste Oil	Heating Oil	Oil/Water
Year Installed	before 1972	1981	1972	1978	before 1972	1978	1975
Material of Construction	Steel	Fiberglass	Steel	Fiberglass	Steel	Fiberglass	Concrete
Coatings A. Interior B. Exterior	A. unlined B. uncoated	A. unlined B. uncoated	A. unlined B. uncoated	A. unlined B. uncoated	A. unlined B. uncoated	A. unlined	A. unlined
Cathodic Protection	None	None	None	None	None	None	None
Status of Tank (Year abandoned)	In use	In use	In use	In use	In use	In use	In use